Chapter

12

POLLUTANT LOADING AND REMOVAL ESTIMATES

INTRODUCTION 12.1

This chapter presents annual pollutant loading and removal estimates for the CWT industry associated with each of the subcategories and regulatory options considered by EPA in developing the proposed effluent limitations and pretreatment standards. EPA estimated the pollutant loadings and removals from CWT facilities to evaluate the effectiveness of different treatment technologies and to evaluate how costly these regulatory options were in terms of pollutant removals. EPA also used this information in analyzing potential benefits from the removal of pollutants discharged to surface waters directly or indirectly through publicly owned treatment works (POTWs). EPA estimated raw, current, and post-compliance pollutant loadings and pollutant removals for the industry using data collected from the industry throughout development of the proposed rule. This assessment uses the following definitions for raw, current, and post-compliance pollutant loadings:

- Raw loadings -- For the metals and organics subcategory, raw loadings represent CWT waste receipts, that is, typically untreated wastewater as received from customers. For the oils subcategory, raw loadings represent the effluent from the initial processing of oil bearing, CWT waste receipts, that is, effluent from emulsion breaking and/or gravity separation.
- Current loadings -- These are the pollutant loadings in CWT wastewater that are currently being discharged to POTWs and surface waters. These loadings account for wastewater treatment currently in place at CWTs.
- Post-compliance loadings -- These are the pollutant loadings in CWT wastewater that would be discharged to POTWs and surface waters if the proposed rule is promulgated. EPA calculated these loadings assuming that all CWTs would achieve treatment at least equivalent to that which may be achieved by employing the technology option selected as the basis of the limitations or standards.

The following information is presented in this chapter:

- Section 12.2 summarizes the data sources used to estimate pollutant loadings and removals;
- Section 12.3 discusses the methodology used to estimate current loadings;
- Section 12.4 discusses the methodology used to estimate post-compliance pollutant loadings;
- Section 12.5 discusses the methodology used to estimate pollutant removals;
- Section 12.6 presents the pollutant loadings and removals for each regulatory option, including current and post-compliance pollutant loadings.

DATA SOURCES 12.2

As previously explained in Chapter 2, EPA primarily relied on three data sources to estimate pollutant loadings and removals: industry responses to the 1991 Waste Treatment Industry Questionnaire, industry responses to the Detailed Monitoring Questionnaire, and wastewater sampling data collected by EPA.

Chapter 2 of this document discusses each of these data sources in detail.

METHODOLOGY USED TO DEVELOP CURRENT LOADINGS ESTIMATES *12.3*

EPA calculates current loadings for a specific facility from the effluent flow rate of the facility and the concentration of pollutants in its effluent obtained from effluent monitoring data. EPA does not have data for every facility in the database to calculate current loadings. For some, EPA has no effluent monitoring data, while for others, EPA may have only limited monitoring data for a few parameters. In many cases, EPA has effluent monitoring data, but the data do not represent CWT wastewaters only. As discussed previously, most CWT facilities commingle CWT wastewaters with non-CWT wastewaters such as industrial wastestreams or stormwater prior to monitoring for compliance. Most CWT facilities with waste receipts in more than one subcategory commingle CWT wastestreams prior to monitoring for performance. Some facility supplied data, therefore, is insufficient for estimating current loadings.

When possible, EPA determined current loadings for an individual facility based on information reported by that facility. For most CWT facilities, however, EPA had to develop estimated current loadings. EPA's methodology differs depending on the subcategory of CWT facilities and individual facility characteristics. Factors that EPA took into account in estimating current loadings include: 1) the analytical data available for the subcategory; 2) the characteristics of the facilities in the subcategory; and 3) the facility's treatment train. For facilities in multiple subcategories, EPA estimated loadings for that portion of the wastestream in each subcategory and subsequently added them together. The sections that follow discuss the current loadings methodologies for each subcategory.

Current Loadings Estimates for the Metals Subcategory *12.3.1*

EPA calculated current loadings for the metals subcategory facilities by assigning pollutant concentrations based on the type of treatment currently in-place at each facility. EPA placed in-place treatment for this subcategory in one of five classes:

1) raw, or no metals treatment;
2) primary precipitation with solids-liquid separation;
3) primary precipitation with solids-liquid separation plus secondary precipitation with solids-liquid separation;
4) primary precipitation with solids-liquid separation plus secondary precipitation with solids-liquid separation followed by multi-media filtration (EPA based the BAT/BPT/PSES proposed limitations and standards for this subcategory on this technology); and
5) selective metals precipitation with solids-liquid separation plus secondary precipitation with solids-liquid separation plus tertiary precipitation with solids-liquid separation (EPA based the NSPS/PSNS proposed limitations and standards on this technology).

Table 12.1 shows the current loadings estimates for each classification and the following five sections (12.3.1.1 through 12.3.1.5) detail the estimation procedure for each classification.

Table 12.1. Metals Subcategory Pollutant Concentration Profiles for Current Loadings

Pollutant of Concern	Raw Treatment (ug/L)	Primary Precipitation (ug/L)	Secondary Precipitation (ug/L)	BAT Option Technology (ug/L)	Selective Metals Precipitation (ug/L)
CONVENTIONALS					
Oil and Grease [2]	685,300	143,160	93,348	56,279	< 5,000
Total Suspended Solids (TSS)	27,957,052	840,000	833,266	113,197	9,250
PRIORITY METALS					
Antimony	116,714	7,998	768	170	21
Arsenic	1,790	84	280	143	11
Cadmium	44,629	21	63	45	82
Chromium	1,186,645	387	671	1,177	40
Copper	1,736,413	448	800	581	169
Lead	211,044	393	356	117	55
Mercury	300	50	6	1	0
Nickel	374,739	2,787	1,968	1,070	270
Selenium	328	514	433	347	210
Silver	1,105	91	70	23	5
Thallium	461	26	240	N/A[1]	21
Zinc	978,167	3,900	3,550	422	206
NON-CONVENTIONAL METALS					
Aluminum	378,955	5,580	27,422	856	73
Barium	941	N/A[1]	221	N/A[1]	N/A[1]
Boron	153,726	31,730	32,131	8,403	66,951
Cobalt	25,809	254	200	115	57
Iridium	51,231	3,283	3,500	500	N/A[1]
Iron	588,910	15,476	8,018	6,803	387
Lithium	114,438	53,135	976	1,927	N/A[1]
Manganese	26,157	245	2,195	49	12
Molybdenum	48,403	3,403	2,690	1,747	528
Silicon	284,693	2,590	1,238	1,447	356
Strontium	7,605	3,561	1,223	100	N/A[1]
Tin	1,337,924	1,026	552	90	28
Titanium	795,623	239	45	57	4
Vanadium	38,570	37	85	12	11
Yttrium	96	26	48	5	5
Zirconium	1,477	N/A[1]	762	1,287	N/A[1]
CLASSICAL PARAMETERS					
Chemical Oxygen Demand (COD)	13,963,394	10,628,000	4,537,778	1,333,333	108,802
Hexavalent Chromium	1,923,560	4,114	361	800	43
Ammonia as N	216,097	120,790	89,997	15,630	9,123
Cyanide	12,285	763	1,910	82	N/A[1]

[1]Concentration values for certain pollutants were not available for some classifications.

[2]EPA determined that the oil and grease concentration listed for raw loadings includes data from a facility (4382) which commingles oils subcategory waste receipts with metals subcategory receipts. The recalculated raw loadings oil and grease concentration is 27,589 ug/L, after excluding the data from the facility 4382. EPA will incorporate this change into the overall loadings and removals calculations between proposal and promulgation.

Raw Loadings for the Metals Subcategory *12.3.1.1*

EPA classified metals subcategory facilities with no chemical precipitation in the "raw" class (even if they had other treatment in place, such as activated carbon). EPA assigned the "raw" current loadings estimates to three facilities in the metals subcategory. EPA based its estimates for raw wastewaters on data from eight sample points at five sampling episodes (refer to Table 12-2 for sample episode and sample point identifiers). The data from these episodes include composite samples from continuous systems and grab samples from batch systems. In order to compare and use continuous and batch system data interchangeably, EPA calculated a daily average value for the batch systems by averaging sample measurements from all batches for a single day. Therefore, if the facility treated nine batches during a four day sampling episode, EPA calculated four daily averages for the episode. EPA incorporated non-detect measurements at the sample-specific detection levels. The Agency averaged duplicate batch samples together first, and then included the averaged value in the daily average calculation.

Once EPA calculated daily averages for the batch systems, EPA then averaged the batch daily averages with the daily composite values to obtain raw pollutant concentrations. As an illustrative example, Table 12-2 shows the data used to obtain the raw wastewater estimation for aluminum: 378,955 ug/L. Table 12-2 shows that this estimation comes from twenty-nine daily averages (some from continuous systems and some from batch systems) from fifty-nine analyses. Raw wastewater estimations for other pollutants were calculated in a similar manner.

Table 12-2. Example of Metals Subcategory Influent Pollutant Concentration Calculations[1]

Sample Point	Raw Aluminum Daily Averages (ug/L)					# of measurements
Episode 4378-01	389,338	189,223	3,128	8,376		23 (2 duplicate values)
Episode 4378-03	2,080,000	2,090,000	745,000	91,700	130,000	11 (2 duplicate values)
Episode 4055-01	31,800	838,275	260,000			5
Episode 1987-01	839,000	792,000	859,000			3
Episode 1987-02	577,500	53,400				3 (1 duplicate value)
Episode 4393-01	3,730	29,400				2 (1 non-detect value)
Episode 4382-07	84,400	139,000	171,000	145,000	330,000	6 (1 duplicate value)
Episode 4393-05	72,400	3,765	6,150	15,900	11,200	6 (1 duplicate and 1 non-detect value)

[1]The Raw Aluminum Concentration is 378,955 ug/L -- the average of sample values in the table.

Primary Precipitation with Solids-Liquid Separation Loadings *12.3.1.2*

EPA estimated pollutant concentrations resulting from primary precipitation and solids-liquid separation using data from EPA sampling episodes and industry supplied effluent monitoring data. EPA used data from three sampling episodes and one facility's effluent monitoring data submissions to represent the current loadings for 32 of the metals subcategory facilities. The episodes used are detailed monitoring questionnaire 613 (industry supplied effluent monitoring data), sample point 16; episode 4382, sample point 12; episode 1987, sample point 3; and episode 4798, sample point 3. The facility supplied effluent monitoring data was collected as grab samples from batch systems. For each day, EPA averaged the batch

samples together to obtain a daily average. Conversely, the EPA sampling episode data came from continuous systems. Regardless of the sample type, the analysis averaged the daily average values from a facility together to give a facility average, then combined the four facility averages to give a pollutant concentration average. Table 12.1 shows the concentrations representing primary precipitation for the relevant pollutants of concern.

Secondary Precipitation with Solids-Liquid Separation Loadings 12.3.1.3

EPA estimated current loadings for facilities with secondary chemical precipitation using data from three sampling points at three separate episodes. These are episode 4393, sample point 13; episode 4382, sample point 12; and episode 4798, sample point 05 (which represents the technology basis for the proposed metals subcategory BPT/BAT/PSES option). EPA then averaged the facility average effluent values from liquid-solids separation following secondary chemical precipitation to give concentrations for the relevant pollutants of concern. Table 12-1 summarizes these average values.

Technology Basis for the Proposed BPT/BAT/PSES Option 4 Loadings 12.3.1.4

EPA used the long-term averages from Metals Option 4 -- batch primary precipitation with solids-liquid separation plus secondary precipitation with solids-liquid separation followed by multi-media filtration -- to represent current loadings at three facilities in the metals subcategory. The facility sampled by EPA that employs the technology basis for the BPT/BAT/PSES Option, obviously, is assigned its current loadings. EPA modeled the loadings for two facilities that utilize tertiary precipitation with the BPT/BAT/PSES option current loadings. EPA believes that facilities utilizing tertiary precipitation will not need to alter their system to meet the proposed pretreatment standards and limitations. By assigning current loadings estimates based on the Option 4 technology basis to the tertiary systems, EPA may have overestimated current loadings at these two facilities. However, EPA does not estimate any post-compliance pollutant reductions at these facilities.

Selective Metals Precipitation (NSPS/ PSNS Proposed Option 3) Loadings 12.3.1.5

Only one facility in the metals subcategory utilizes selective metals precipitation. EPA sampled this facility during development of this rule. Therefore, the current loadings pollutant concentrations for this facility are not estimates, but measured data. Table 12.1 summarizes these pollutant concentrations.

Current Loadings Estimates for the Oils Subcategory 12.3.2

Based on questionnaire responses and site visits, EPA found that all facilities which treat oily wastewaters, for which EPA has data, currently employ emulsion breaking and/or gravity separation. If emulsions are present in the incoming waste receipts, the facility first makes use of emulsion breaking. If not, the waste receipts generally bypass emulsion breaking and the facility processes the waste through a gravity separation step for gross separation of the water and the oil phase. A facility may often follow up these pretreatment steps by other wastewater treatment technologies. Therefore, EPA believes that, at a minimum, it may characterize current loadings for oils subcategory discharges by analyzing samples obtained from the effluent of emulsion breaking/gravity separation.

EPA has seven data sets which represent effluent from emulsion breaking/gravity separation systems. EPA collected these seven data sets during EPA sampling episodes at various types of oily waste facilities. Six of these seven data sets represent facilities that treat oily

wastewater and recover/process used oil. One facility, which primarily accepts bilge water, performs oily wastewater treatment only. The annual volume of treated oily wastewater discharged at these facilities ranges from 174,000 gallons/year to 35 million gallons/year. Two of the data sets represent facilities that only accept non-hazardous wastes, while the other five data sets represent facilities which are permitted by RCRA to additionally accept hazardous wastes.

For each pollutant of concern, each of the seven emulsion breaking/gravity separation data sets contains the mean concentration of the data collected over the sampling episode (usually a duration of five days). This mean includes measured (detected) and non-detected values. The value substituted for each non-detected measurement was either 1) the sample-specific detection limit or 2) the average of the measured (detected) values across all seven data sets. Section 12.3.2.1 discusses EPA's representation of non-detect values for this analysis. Section 12.3.2.1 further discusses EPA's representation of the one biphasic sample. Table 12-7 presents a compiled summary of these seven data sets. For each episode and each pollutant, the table presents the mean concentration of the data collected over the sampling episode. Figure 12-1 shows the procedure EPA used to estimate the mean concentration data over the seven sampling episodes.

EPA has facility-specific information in its database for 84 oils subcategory facilities. Of these 84 facilities, EPA has sampling data for seven. For the remainder of the facilities, EPA does not have current loadings data. EPA does, however, have facility-specific information on the volume of wastewater being discharged and the treatment train currently in use. EPA evaluated several ways to associate one of the seven emulsion breaking/gravity separation data sets to each of the facilities for which EPA needed to estimate current performance. EPA, therefore, reviewed the seven emulsion breaking/gravity separation data sets to determine if there was a relationship between the concentration of pollutants, and facility flow, but found no evidence of relationship.

Consequently, EPA randomly assigned one of the seven data sets to each of the facilities that required current loadings estimates. For facilities which only employ emulsion breaking/gravity separation, EPA estimated current loadings for each pollutant using values in the randomly assigned data set. For facilities which use additional treatment after that step, EPA further reduced the pollutant loadings for certain pollutants (or all pollutants depending on the technology) in the randomly assigned data set to account for the additional treatment-in-place at the facility.

TREATMENT-IN-PLACE

As mentioned previously, there are many configurations of treatment trains in this subcategory. While EPA does not have sampling data representing each of these treatment configurations, EPA does have sampling data representing each of the individual treatment technologies currently in place at oily waste facilities. While EPA collected all of the data at CWT facilities, EPA collected some of the data it used to develop treatment-in-place credits at facilities in other CWT subcategories. For some technologies, EPA has sampling data from a single facility, while for others, EPA has sampling data from multiple CWT facilities.

In order to estimate the current pollutant reductions due to additional treatment-in-place at oils facilities, for each technology, EPA compiled and reviewed all CWT sampling data for which EPA collected influent and effluent data. EPA subjected the influent data to a similar screening process as the one used in determining long-term averages. For each episode, EPA retained influent and effluent data for a specific pollutant

only if the pollutant was detected in the influent at treatable levels (10 times the baseline value[1]) at least 50 percent of the time. For each facility, EPA then calculated an "average" percent removal for metals (averaging the percent removal for each metal), an "average" percent removal for organics, and an "average" percent removal for BOD_5, TSS, and oil and grease. EPA rounded the averages to the nearest 5 percent. When the "average" percent removal for more than one third of the pollutants in a compound class (i.e., metals, organics, BOD_5, TSS, and oil and grease) was zero or less, EPA set the "average" percent removal for the class of compounds equal to zero. EPA recognizes that treatment technologies are not equally effective in reducing all metals and/or all organics from wastewater, but believes this provides a reasonable estimate. The result is that, for some pollutants, EPA believes it may have underestimated the removals associated with the additional treatment-in-place, while for other pollutants, EPA may have overestimated the removals.

Table 12-3 shows the percent removal credited to each technology. For technologies that EPA evaluated at more than one CWT facility, the value for each class of compounds represents the lowest value at the facilities. For example, EPA sampled at two facilities that use multimedia filtration. The average percent removal of metal pollutants at facility 1 and facility 2 is 60 percent and 30 percent, respectively. Table 12-3 shows that EPA used 30 percent to estimate metals removal in multimedia filtration systems. EPA believes that using the lower percent removal of the "best" performers provides a reasonable estimate of the percent removals of these technologies for the rest of the industry and may even overstate the percent removals for some facilities that may not be operating the treatment technologies efficiently.

For some classes of compounds and some technologies, EPA does not have empirical data from the CWT industry to estimate percent removals. For these cases, EPA assumed percent removals based on engineering judgement. EPA assumed that air stripping is only effective for the removal of volatile and semi-volatile organic pollutants. EPA also assumed that chemical precipitation is ineffective for the treatment of organic pollutants. Finally, EPA assumed a 50 percent reduction in organic CWT pollutants through carbon adsorption treatment. EPA recognizes that carbon adsorption, given the correct design and operating conditions can achieve much higher pollutant removals. However, for this industry, EPA believes that the complex matrices, variability in waste receipts, and high loadings would compromise carbon adsorption performance.

[1]Defined in chapter 15.

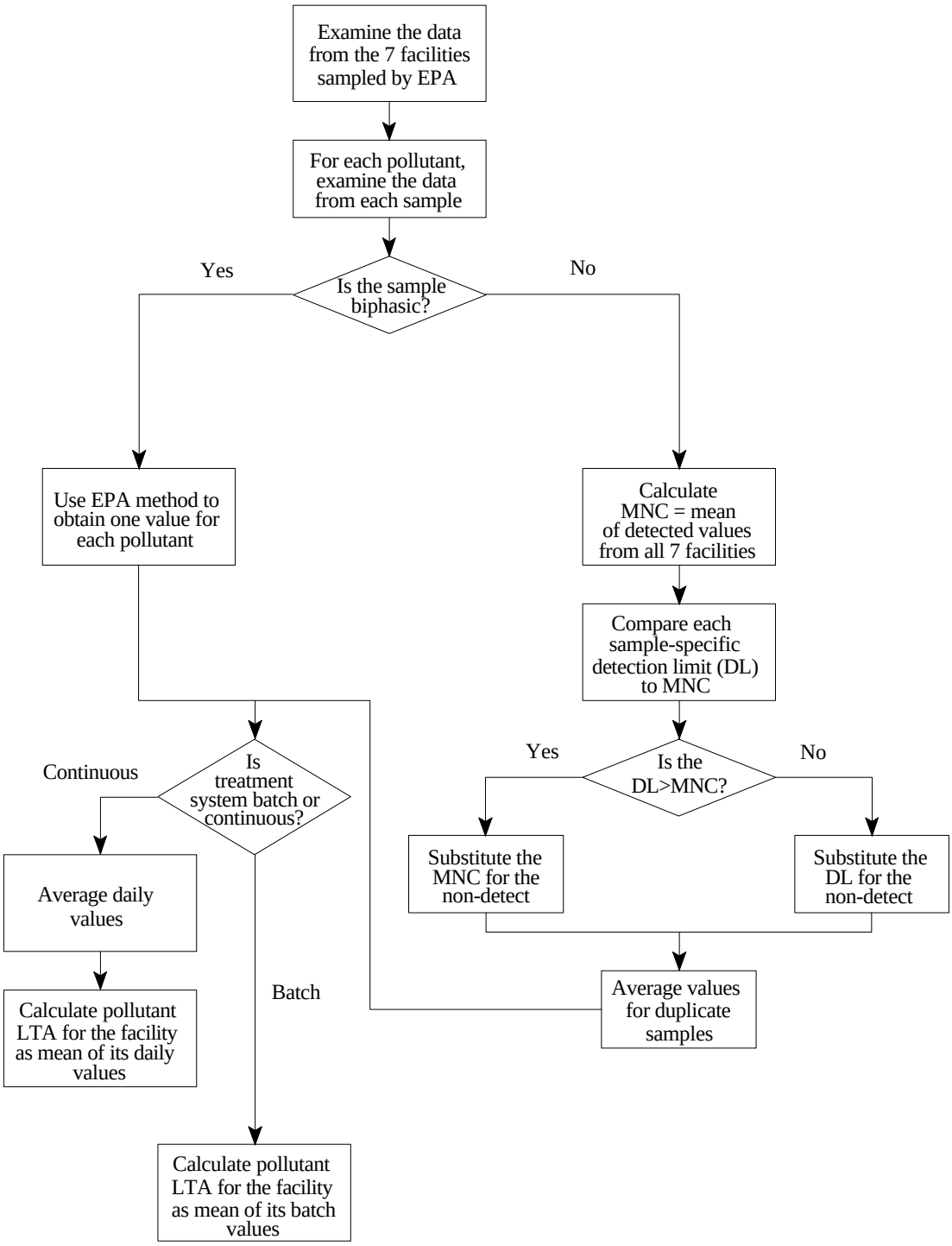

Figure 12-1 Calculation of Current Loadings for Oils Subcategory

Table 12-3. Treatment-in-Place Credit Applied to Oils Facilities

Pollutant Group	Treatment Technology							
	Chemical Precipitation	Carbon Adsorption	Air Stripping	Ultra filtration	Biological	Multi-media/ Sand Filtration	DAF	Secondary Separtion
BOD_5	0	0	0*	55	50	10	10	5
Oil and Grease	45	45	0*	85	65	0	60	30
TSS	85	0	0*	100	50	55	80	0
Metals	75	0	0*	75	15	30	50	0
Organics	0*	50*	70	85	75	0	40	50

*Value is based on engineering judgement.

In determining current loadings for facilities with additional treatment-in-place, EPA then reduced the current loadings concentrations established for the facility with gravity separation/emulsion breaking alone by the appropriate percent removal as defined above. For facilities with multiple treatment technologies in their treatment train, EPA credited each of the treatment technologies in the order that the process occurs in their treatment train.

Issues Associated with Oils Current Performance Analyses *12.3.2.1*

This section describes four issues associated with estimating the current performance of the oils subcategory. The first issue is the dilution required in analyses of some highly concentrated samples representing the baseline technology (emulsion breaking/gravity separation). The second issue is the appropriate procedure for incorporating the concentrations of a biphasic sample into the estimates of current performance. The third issue is the appropriateness of various substitution methods for the non-detected measurements, especially of diluted samples. The fourth issue discussed is EPA's approach to assigning the seven emulsion breaking/gravity separation data sets randomly to oils facilities.

Dilution Of Samples During Laboratory Analysis

Effluent from emulsion breaking/gravity separation operations may be highly concentrated, which may present difficulties in analyzing such effluent. Consequently, in its analysis of some samples, EPA needed to dilute the samples in order to reduce matrix difficulties (such as interference) to facilitate the detection or quantitation of certain target compounds. For some organic compounds, moreover, EPA also had to dilute samples where a highly concentrated sample could not be concentrated to the method-specified final volume.

If EPA diluted a sample for analytical purposes, EPA adjusted the particular pollutant measurement to correct for the dilution. For example, if a sample was diluted by 100 and the measurement was 7.9 ug/L, the reported value was adjusted to 790 ug/L (i.e., 7.9 ug/L * 100). In general, the sample-specific detection limits (DLs) for a pollutant were equal to or greater than the nominal quantitation limit described in Chapter 15. Dilution generated sample-specific DLs greater than the nominal quantitation limit.

Because wastes generated using the proposed technologies will be less concentrated than emulsion breaking/gravity separation operations, EPA does not believe effluent samples collected

to demonstrate compliance with the proposed limitations and standards will necessitate dilution and therefore result in effluent values with large sample-specific DLs. Further, a laboratory can overcome potential analytical interferences using procedures such as those suggested in *Guidance on the Evaluation, Resolution, and Documentation of Analytical Problems Associated with Compliance Monitoring* (EPA 821-B-93-001). Thus, in demonstrating compliance, EPA would not allow dilution of a sample to a sample-specific DL greater than the limitation or standard.

BIPHASIC SAMPLES

EPA used a number of different analytical methods to determine the pollutant levels in the effluent samples from facilities that employ chemical emulsion breaking/gravity separation for treating oily wastewater. Each method is specific to a particular analyte or to structurally similar chemical compounds such as volatile organics (analyzed by Method 1624) and semivolatile organics (analyzed by Method 1625). In developing the laboratory procedures described in Method 1625, EPA included a procedure for analyzing aqueous samples and another procedure for analyzing biphasic samples. Some effluent samples from emulsion breaking/gravity separation were biphasic. That is, each sample separated into two distinct layers, an aqueous layer and an organic one. In these instances, if the phases could not be mixed, EPA analyzed each phase (or layer) separately. Thus, each pollutant in a sample analyzed by Method 1625 had two analytical results, one for the organic phase and the other for the aqueous phase. There were three such samples in the oils subcategory. Only sample number 32823 (episode 4814B), however, represents oily wastes following emulsion breaking/gravity separation. This sample is part of one of the seven data sets representing emulsion breaking/gravity separation randomly assigned to facilities without concentration data. For this sample, EPA combined the two concentration values into a single value for each pollutant analyzed using Method 1625. The discussion below describes the procedures for combining the two concentration values and Table 12-4 summarizes these procedures. Table 12-5 provides examples of these procedures. DCN[2] 23.13

If the pollutant was detected in the organic phase, EPA adjusted the analytical results to account for the percent of the sample in each phase. For sample 32823, 96 percent of the sample volume was aqueous and the remaining 4 percent was organic. Thus, EPA multiplied the aqueous value (detected value or sample-specific DL) by 0.96 and the organic value by 0.04. EPA then summed the two adjusted values to obtain the total concentration value for the pollutant in the sample.

If the pollutant was not detected in the organic phase, EPA used several different procedures depending on the pollutant and its concentration in the aqueous phase. A factor which complicated EPA's analysis was that sample-specific DLs for pollutants in the organic phase were 1000[3] times greater than the minimum levels for Method 1625. When a measurement result indicates that a pollutant is not detected, then the reported sample-specific DL is an upper bound for the actual concentration of the pollutant in the sample. When some sample-specific DLs for the organic phase (which were 1000 times the minimum level) were

[2] Items identified with document control numbers (DCN) are located in the record to the proposed rulemaking.

[3] Because the volume of the organic phase was small, the organic phase sample required dilution (by 1000) for analysis. In contrast, the aqueous phase had sufficient amount so that it was not diluted.

multiplied by 0.04, the adjusted non-detected values were greater than the measured amount in the aqueous phase. EPA concluded that substituting the sample-specific DL for the non-detected results in the organic phase in these circumstances might over-estimate the amount of pollutant in the sample. Thus, EPA applied one of the two alternative substitution procedures described below for the sample-specific DLs resulting from the organic phase.

First, if EPA did not detect the pollutant in either phase, EPA considered the sample to be non-detect at the sample-specific DL of the aqueous phase. This value for the aqueous phase was equal to the minimum level specified in Method 1625.

Second, if the pollutant was detected in the aqueous phase (and non-detected in the organic phase), EPA used a procedure that compared the non-detected organic values to the detected aqueous value adjusted by a partition ratio (550). EPA determined this partition ratio using the average of the ratios of the detected organic phase concentrations to the detected aqueous phase concentrations for the pollutants that had detected values in both phases. There were twenty-two pollutants that were used to calculate this value of 550. These pollutants are in four structural groupings of organic pollutants: chlorobenzenes, phenols, aromatic ethers, and polynuclear aromatic hydrocarbons. The ratios were similar in each of the structural groupings; consequently, EPA determined that a single value for the partition ratio was appropriate. EPA then multiplied the aqueous phase concentration value by this partition ratio of 550. If this value was less than the sample-specific DL of the pollutant in the organic phase, EPA substituted this value for the organic phase sample-specific DL. Otherwise, EPA used the organic phase sample-specific DL. EPA then multiplied the values for the aqueous and organic phases by the relative volume amounts (0.96 and 0.04, respectively) and summed them to obtain one value for the sample.

Table 12-4. Biphasic Sample Calculations (Summary of rules for combining aqueous/organic phase concs.)

Censoring types (i.e., detected or non-detected)			Method for obtaining combined value
Aqueous phase	Organic phase	Combined result (same as aqueous)	
NC	NC	NC	0.96*AQ + 0.04*ORG
ND	NC	ND	0.96*AQ (use DL) + 0.04*ORG
ND	ND	ND	AQ (use DL)
NC	ND (DL>550*AQ)	NC	0.96*AQ + 0.04*(550*AQ)
	ND (DL<=550*AQ)		0.96*AQ + 0.04*ORG (use DL)

AQ = value for aqueous phase NC = non-censored (detected)
ORG = value for organic phase ND = non-detected DL = sample-specific detection limit

Table 12-5. Examples of Combining Aqueous and Organic Phases for Sample 32823

Pollutant	Reported Concs. (ug/L)		Concentration for Sample (ug/L)	Calculation for Sample	Comment
	Aqueous Phase	Organic Phase			
Acenaphthene	668.6	319,400	13,418	(0.96*668.6 ug/L) + (0.04*319,400 ug/L)	Concentrations are weighted by relative amounts of the sample volume in each phase: 96% aqueous and 4% organic
Benzo(a)pyrene	158.4	162,950	6,670	(0.96*158.4 ug/L) + (0.04*162,950 ug/L)	
4,5-Methylene Phenanthrene †	ND (10)	118,330	ND (4,743)	(0.96*10 ug/L) + (0.04*118,330 ug/L)	
Aniline	ND (10)*	ND (10,000)	ND (10)		no calculation necessary
1-phenyl -naphthalene ‡	10.49	ND (10,000)	240.9	(0.96*10.49 ug/L) +(0.04*550*10.49 ug/L)	The sample-specific DL of 10,000 ug/L for the organic phase is greater than 5570 ug/L (i.e., 550 times 10.49 ug/L)
Alpha-Terpineol	1,885.8	ND (10,000)	2,210	(1,885.8 ug/L*0.96) + (10,000 ug/L*0.04)	The sample-specific DL of 10,000 ug/L for the organic phase is less than 1,037,190 (i.e., 550 times 1885.8 ug/L)

* ND=non-detected measurement. The sample-specific DL is provided in the parentheses.

† None of measurements of the pollutants of concern from this sample resulted in a non-detected measurement for the aqueous phase with a detected measurement for the organic phase. This analyte is shown for demonstration purposes.

‡ None of measurements of the pollutants of concern from this sample resulted in a detected measurement for the aqueous phase with a sample-specific DL for the organic phase that was greater than 550 times the measurement from the aqueous phase. This analyte is shown for demonstration purposes.

NON-DETECT DATA IN COMPLEX SAMPLES

EPA included values for measurements reported as "non-detected" when it calculated the mean for each pollutant of concern in the seven emulsion breaking/gravity separation data sets. In some instances, the measurements reported as non-detected had sample-specific detection limits that were well in excess of the minimum analytical detection limits. The high sample-specific detection limits occurred because the samples contained many pollutants which interfered with the analytical techniques. EPA considered several approaches for handling these sample-specific non-detected measurements because, by definition, if a pollutant is 'not detected', then the pollutant is either not present at all (that is, the concentration is equal to zero) or has a concentration value somewhere between zero and the sample-specific detection limit (DL).

EPA considered the following five approaches to selecting a value to substitute for non-detected measurements:

1. Assume that the pollutant is not present in the sample and substitute zero for the non-detected measurement (that is, ND=0).
2. Assume that the pollutant is present in the sample at a concentration equal to the minimum analytical level (that is,

ND=minimum analytical detection limit (MADL)).

3. Assume that the pollutant is present at a concentration equal to half the sample-specific DL (that is, ND=DL/2). (In general, the values of the sample-specific DLs are equal to or greater than the values of the minimum analytical detection limits used in the second approach.)
4. Assume that the pollutant is present at a concentration equal to the sample-specific DL (that is, ND=DL). This is the substitution approach that was used in the 1995 proposal, for the influent pollutant loadings for the other two subcategories, and for the proposed limitations and standards for all three subcategories.
5. Assume that the pollutant is present at a concentration equal to either the sample-specific DL or the mean of the detected (or non-censored) values (MNC) of the pollutant.[4] EPA used the lower of the two values (that is, ND=minimum of DL or MNC).

EPA ultimately selected the approach described in 5. because Agency concluded that it provided the most realistic estimate of current performance in these data sets.

Table 12-6A shows how EPA applied the five substitution approaches to data for hypothetical pollutant X for seven facilities. The example shows the types of calculations EPA performed in comparing the five approaches. The example includes facilities that treat wastes on a batch and continuous basis. It also includes a mixture of detected and non-detected measurements as well as duplicate samples. For each facility, the table lists the analytical results reported by the laboratory for pollutant X. If the reported value is non-detected, then this analytical result is identified in the table as "ND" with the reported sample-specific DL in the parenthesis. If the value is detected, the analytical (measured) result is shown in the table and is identical in all five approaches because the substitutions apply only to non-detected values. Finally, for each of the seven facilities, the table shows five long-term averages for pollutant X--one for each of the five substitution approaches.

[4]For each pollutant, EPA calculated the mean (or average) of the detected (or non-censored) values (MNC) using all detected values in the seven data sets except for the biphasic sample. The substitutions were only applied to non-detected measurements observed in aqueous samples because the non-detected measurements in the biphasic sample were evaluated separately as described in the previous section. While EPA believes that biphasic samples can result from some wastes in this subcategory after processing through emulsion breaking/gravity separation, EPA believes that it is appropriate to use only detected measurements from aqueous samples in calculating the mean that will be compared to each sample-specific DL in aqueous samples.

Table 12-6A. Example of Five Substitution Methods for Non-Detected Measurements of Hypothetical Pollutant X

Facility	Sampling Day or Batch Number	Reported Values (ug/L)	**Approach 1** ND=0	**Approach 2** ND=MADL † (MADL=10 ug/L)	**Approach 3** ND=DL/2	**Approach 4** ND=DL	**Approach 5** ND= min(DL,MNC)
A	Batch 1	99	99	99	99	99	99
	Batch 1	95	95	95	95	95	95
	Batch 2	ND (300)*	0	10	150	300	300
	Batch 3	84	84	84	84	84	84
	Batch 4	258	258	258	258	258	258
		A: LTA	**122**	**125**	**160**	**197**	**197**
B	Day 1	ND (100)	0	10	50	100	100
	Day 2	ND (1000)	0	10	500	1000	315
		B: LTA	**0**	**10**	**275**	**550**	**208**
C	Day 1	57	57	57	57	57	57
	Day 2	84	84	84	84	84	84
	Day 3	26	26	26	26	26	26
		C: LTA	**56**	**56**	**56**	**56**	**56**
D	Day 1	73	73	73	73	73	73
	Day 2 (duplicate)	ND (100)	0	10	50	100	100
	Day 2 (duplicate)	ND (10)	0	10	5	10	10
	Day 3	62	62	62	62	62	62
		D: LTA	**45**	**48**	**54**	**63**	**63**
E	Day 1	411	411	411	411	411	411
	Day 2	257	257	257	257	257	257
	Day 3	79	79	79	79	79	79
	Day 4	ND (1000)	0	10	500	1000	315
	Day 5	ND (220)	0	10	110	220	220
		E: LTA	**149**	**153**	**271**	**393**	**256**
F	Day 1	ND (300)	0	10	150	300	300
	Day 2	320	320	320	320	320	320
	Day 3	44	44	44	44	44	44
	Day 4	47	47	47	47	47	47
	Day 5	180	180	180	180	180	180
		F: LTA	**118**	**120**	**148**	**178**	**178**
G	Day 1	1234	1234	1234	1234	1234	1234
	Day 2	855	855	855	855	855	855
	Day 3	661	661	661	661	661	661
	Day 4	1377	1377	1377	1377	1377	1377
		G: LTA	**1032**	**1032**	**1032**	**1032**	**1032**
	MNC =	315	(MNC = mean of detected values from all seven facilities)				

* ND=non-detected measurement. The sample-specific detection limit is provided in the parentheses.

† MADL=minimum analytical detection level

While Table 12-6A provides an example using the five approaches, DCN 23.8 shows the results of the substitution values under the first four approaches to the actual seven concentration data sets from the seven facilities with emulsion breaking/gravity separation. DCN 23.21 shows the results of using the fifth approach. After evaluating the five approaches, EPA prefers Approach 5 because it tends to minimize the effect of large detection levels on the long-term averages while providing reasonable estimates of the actual concentrations. Furthermore, EPA feels that Approach 5 is superior to the other four approaches. In particular, the first and second approaches (substitutions of zero or the MADL, respectively, for non-detects) are poor choices because they are likely to provide unrealistically low estimates of the analyte concentrations in samples with high sample-specific detection limits, especially when all detected values are substantially greater than zero and the MADL. In addition, the third and fourth approaches (substitution of the sample-specific DL or DL/2, respectively) are poor choices because the substitutions could exceed the detected values in some cases, and thus, possibly could over estimate the concentrations in non-detected measurements. EPA's analyses also show that there is little or no difference in the averages between using the sample-specific DL or half the sample-specific DL for many of the facility/analyte data sets. Thus, EPA has followed the approach outlined in 5 above because it concluded that this approach provides reasonable estimates of the actual concentrations because the substituted values are neither unrealistically low nor exceed the greatest detected value.

Table 12-7 shows the pollutant concentration data sets for the seven facilities (identified as A, B, etc.) using the "Originial" approach (that is, Approach 1: sample-specific DL substituted for non-detected measurements) and the 'Replaced' approach (that is, Approach 5). Each set provides the overall mean (i.e., the average of all values -- detected and non-detected), the mean of the detected values, and the mean of the NDs (i.e., the mean of the substituted values). Both provide the same detected mean value because, unlike the non-detected measurements, no substitutions were made for detected measurements. In contrast, the overall mean and the mean of the NDs vary when one or more values in a facility data set exceed the mean detected value for the pollutant.

Table 12-6B shows the relative effects of EPA's preferred approach in comparison to Approach 1 on the estimates of priority, conventional, and non-priority pollutant concentrations for baseline loadings and the total removals changes for toxic weighted pollutants. In comparison to Approach 1 (EPA's original method), EPA's preferred (or 'replaced') approach (that is, Approach 5) had little noticeable effect on the baseline loadings for the oils subcategory. In other words, the current loadings are approximately the same using either approach. There is, however, a significant decrease in toxic pound-equivalent removals with EPA's preferred approach. Hence, overall toxic pound-equivalent removal estimates using EPA's preferred approach decreased by approximately 34% from those calculated using its original approach (that is, substituting the sample-specific detection limit for all non-detected measurements). The cost effectiveness document provides more information on toxic pound-equivalent removals.

Table 12-6B. Difference in Oils Subcategory Loadings After Non-Detect Replacement Using EPA Approach

Priority Metals & Organics Current Loading (percent change)	Non-Priority Metals & Organics Current Loading (percent change)	Conventional Pollutant Current Loading (percent change)	Pound-Equivalent Net Removals (percent change)
- 5	+ 1	0	- 34

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Ammonia, as N	A	20	0	0.01	mg/L	75.10	75.10	.	75.10	75.10	.
Ammonia, as N	B	2	0	0.01	mg/L	122.50	122.50	.	122.50	122.50	.
Ammonia, as N	C	3	0	0.01	mg/L	64.00	64.00	.	64.00	64.00	.
Ammonia, as N	E	5	0	0.01	mg/L	103.76	103.76	.	103.76	103.76	.
Ammonia, as N	F	5	0	0.01	mg/L	98.60	98.60	.	98.60	98.60	.
Ammonia, as N	G	4	0	0.01	mg/L	382.13	382.13	.	382.13	382.13	.
Biochemical Oxygen Demand	A	20	0	2.00	mg/L	8188.00	8188.00	.	8188.00	8188.00	.
Biochemical Oxygen Demand	B	2	0	2.00	mg/L	4670.00	4670.00	.	4670.00	4670.00	.
Biochemical Oxygen Demand	C	3	0	2.00	mg/L	7133.33	7133.33	.	7133.33	7133.33	.
Biochemical Oxygen Demand	D	4	0	2.00	mg/L	919.75	919.75	.	919.75	919.75	.
Biochemical Oxygen Demand	E	5	0	2.00	mg/L	17966.00	17966.00	.	17966.00	17966.00	.
Biochemical Oxygen Demand	F	5	0	2.00	mg/L	6940.00	6940.00	.	6940.00	6940.00	.
Biochemical Oxygen Demand	G	4	0	2.00	mg/L	10842.50	10842.50	.	10842.50	10842.50	.
Chemical Oxygen Demand (COD)	A	20	0	5.00	mg/L	55075.00	55075.00	.	55075.00	55075.00	.
Chemical Oxygen Demand (COD)	B	2	0	5.00	mg/L	26900.00	26900.00	.	26900.00	26900.00	.
Chemical Oxygen Demand (COD)	C	3	0	5.00	mg/L	49000.00	49000.00	.	49000.00	49000.00	.
Chemical Oxygen Demand (COD)	D	4	0	5.00	mg/L	2125.00	2125.00	.	2125.00	2125.00	.
Chemical Oxygen Demand (COD)	E	5	0	5.00	mg/L	27730.00	27730.00	.	27730.00	27730.00	.
Chemical Oxygen Demand (COD)	F	5	0	5.00	mg/L	32750.00	32750.00	.	32750.00	32750.00	.
Chemical Oxygen Demand (COD)	G	4	0	5.00	mg/L	43625.00	43625.00	.	43625.00	43625.00	.
Hexavalent Chromium	A	20	18	10.00	ug/L	546.25	2827.50	292.78	546.25	2827.50	292.78
Hexavalent Chromium	E	5	5	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Hexavalent Chromium	F	5	1	10.00	ug/L	33.40	39.25	10.00	33.40	39.25	10.00
Hexavalent Chromium	G	4	0	10.00	ug/L	48.88	48.88	.	48.88	48.88	.
Nitrate/nitrite	A	20	1	50.00	ug/L	5146.00	5416.32	10.00	5146.00	5416.32	10.00
Nitrate/nitrite	B	2	1	50.00	ug/L	15155.00	30300.00	10.00	15155.00	30300.00	10.00
Nitrate/nitrite	C	3	0	50.00	ug/L	12200.00	12200.00	.	12200.00	12200.00	.
Nitrate/nitrite	E	5	0	50.00	ug/L	1682.00	1682.00	.	1682.00	1682.00	.
Nitrate/nitrite	F	5	0	50.00	ug/L	36300.00	36300.00	.	36300.00	36300.00	.
Nitrate/nitrite	G	4	0	50.00	ug/L	78875.00	78875.00	.	78875.00	78875.00	.
Total Recoverable Oil and Grease	A	20	0	5.00	mg/L	19633.00	19633.00	.	19633.00	19633.00	.
Total Recoverable Oil and Grease	B	2	0	5.00	mg/L	5960.00	5960.00	.	5960.00	5960.00	.
Total Recoverable Oil and Grease	C	3	0	5.00	mg/L	61297.33	61297.33	.	61297.33	61297.33	.
Total Recoverable Oil and Grease	D	4	0	5.00	mg/L	81.19	81.19	.	81.19	81.19	.
Oil and Grease	E	5	0	5.00	mg/L	1745.88	1745.88	.	1745.88	1745.88	.
Oil and Grease	F	5	0	5.00	mg/L	5928.25	5928.25	.	5928.25	5928.25	.
Oil and Grease	G	4	0	5.00	mg/L	2954.38	2954.38	.	2954.38	2954.38	.
SGT-HEM	E	5	0	5.00	mg/L	849.04	849.04	.	849.04	849.04	.
SGT-HEM	F	5	0	5.00	mg/L	1630.99	1630.99	.	1630.99	1630.99	.
SGT-HEM	G	4	0	5.00	mg/L	1232.19	1232.19	.	1232.19	1232.19	.
Total Cyanide	A	5	0	0.02	mg/L	0.06	0.06	.	0.06	0.06	.
Total Cyanide	E	5	5	0.02	mg/L	0.02	.	0.02	0.02	.	0.02
Total Cyanide	F	4	0	0.02	mg/L	0.29	0.29	.	0.29	0.29	.
Total Cyanide	G	4	1	0.02	mg/L	0.38	0.50	0.01	0.38	0.50	0.01
Total Dissolved Solids	D	4	0	10.00	mg/L	16000.00	16000.00	.	16000.00	16000.00	.
Total Dissolved Solids	E	5	0	10.00	mg/L	1777.00	1777.00	.	1777.00	1777.00	.
Total Dissolved Solids	F	5	0	10.00	mg/L	13190.00	13190.00	.	13190.00	13190.00	.
Total Dissolved Solids	G	4	0	10.00	mg/L	19912.50	19912.50	.	19912.50	19912.50	.
Total Organic Carbon (TOC)	A	20	0	1.00	mg/L	3771.50	3771.50	.	3771.50	3771.50	.
Total Organic Carbon (TOC)	B	2	0	1.00	mg/L	22085.00	22085.00	.	22085.00	22085.00	.
Total Organic Carbon (TOC)	C	3	0	1.00	mg/L	4700.00	4700.00	.	4700.00	4700.00	.
Total Organic Carbon (TOC)	D	4	0	1.00	mg/L	542.00	542.00	.	542.00	542.00	.
Total Organic Carbon (TOC)	E	5	0	1.00	mg/L	38055.00	38055.00	.	38055.00	38055.00	.
Total Organic Carbon (TOC)	F	5	0	1.00	mg/L	4218.00	4218.00	.	4218.00	4218.00	.
Total Organic Carbon (TOC)	G	4	0	1.00	mg/L	4171.25	4171.25	.	4171.25	4171.25	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Total Phenols	A	20	0	0.05	mg/L	3.91	3.91	.	3.91	3.91	.
Total Phenols	B	2	0	0.05	mg/L	12.39	12.39	.	12.39	12.39	.
Total Phenols	C	3	0	0.05	mg/L	4.97	4.97	.	4.97	4.97	.
Total Phenols	E	5	0	0.05	mg/L	58.86	58.86	.	58.86	58.86	.
Total Phenols	F	5	0	0.05	mg/L	28.68	28.68	.	28.68	28.68	.
Total Phenols	G	4	0	0.05	mg/L	32.86	32.86	.	32.86	32.86	.
Total Phosphorus	A	20	0	10.00	ug/L	215690.00	215690.00	.	215690.00	215690.00	.
Total Phosphorus	B	2	0	10.00	ug/L	9596000.00	9596000.00	.	9596000.00	9596000.00	.
Total Phosphorus	C	3	0	10.00	ug/L	88000.00	88000.00	.	88000.00	88000.00	.
Total Phosphorus	E	5	0	10.00	ug/L	11255.00	11255.00	.	11255.00	11255.00	.
Total Phosphorus	F	5	0	10.00	ug/L	75670.00	75670.00	.	75670.00	75670.00	.
Total Phosphorus	G	4	0	10.00	ug/L	68650.00	68650.00	.	68650.00	68650.00	.
Total Suspended Solids	A	20	0	4.00	mg/L	6394.90	6394.90	.	6394.90	6394.90	.
Total Suspended Solids	B	2	0	4.00	mg/L	11386.50	11386.50	.	11386.50	11386.50	.
Total Suspended Solids	C	3	0	4.00	mg/L	5806.67	5806.67	.	5806.67	5806.67	.
Total Suspended Solids	D	4	0	4.00	mg/L	40.00	40.00	.	40.00	40.00	.
Total Suspended Solids	E	5	0	4.00	mg/L	896.20	896.20	.	896.20	896.20	.
Total Suspended Solids	F	5	0	4.00	mg/L	6104.00	6104.00	.	6104.00	6104.00	.
Total Suspended Solids	G	4	0	4.00	mg/L	4510.00	4510.00	.	4510.00	4510.00	.
Sulfide, Total (Iodometric)	A	20	5	1000.00	ug/L	865.00	1150.00	10.00	865.00	1150.00	10.00
Sulfide, Total (Iodometric)	B	2	0	1000.00	ug/L	6260.00	6260.00	.	6260.00	6260.00	.
Sulfide, Total (Iodometric)	E	5	0	1000.00	ug/L	829.00	829.00	.	829.00	829.00	.
Sulfide, Total (Iodometric)	F	5	5	1000.00	ug/L	1000.00	.	1000.00	1000.00	.	1000.00
Sulfide, Total (Iodometric)	G	4	4	1000.00	ug/L	1000.00	.	1000.00	1000.00	.	1000.00
Acenaphthene	A	5	5	10.00	ug/L	1720.00	.	1720.00	990.44	.	990.44
Acenaphthene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Acenaphthene	C	3	3	10.00	ug/L	3400.00	.	3400.00	968.15	.	968.15
Acenaphthene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Acenaphthene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Acenaphthene	F	5	3	10.00	ug/L	593.01	872.52	406.67	593.01	872.52	406.67
Acenaphthene	G	4	0	10.00	ug/L	4225.42	4225.42	.	4225.42	4225.42	.
Alpha-terpineol	A	5	5	10.00	ug/L	1720.00	.	1720.00	820.40	.	820.40
Alpha-terpineol	B	2	1	10.00	ug/L	1343.37	1686.74	1000.00	1343.37	1686.74	1000.00
Alpha-terpineol	C	3	1	10.00	ug/L	4660.90	1991.35	10000.00	1662.24	1991.35	1004.03
Alpha-terpineol	D	4	0	10.00	ug/L	128.91	128.91	.	128.91	128.91	.
Alpha-terpineol	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Alpha-terpineol	F	5	4	10.00	ug/L	472.59	842.95	380.00	472.59	842.95	380.00
Alpha-terpineol	G	4	2	10.00	ug/L	923.47	1596.93	250.00	923.47	1596.93	250.00
Aluminum	A	20	0	200.00	ug/L	15760.00	15760.00	.	15760.00	15760.00	.
Aluminum	B	2	1	200.00	ug/L	8050.00	1200.00	14900.00	8050.00	1200.00	14900.00
Aluminum	C	3	0	200.00	ug/L	131476.67	131476.67	.	131476.67	131476.67	.
Aluminum	D	4	1	200.00	ug/L	191.75	246.33	28.00	191.75	246.33	28.00
Aluminum	E	5	0	200.00	ug/L	14130.00	14130.00	.	14130.00	14130.00	.
Aluminum	F	5	0	200.00	ug/L	41110.00	41110.00	.	41110.00	41110.00	.
Aluminum	G	4	0	200.00	ug/L	18200.00	18200.00	.	18200.00	18200.00	.
Aniline	A	5	5	10.00	ug/L	1720.00	.	1720.00	255.63	.	255.63
Aniline	B	2	2	10.00	ug/L	550.00	.	550.00	197.27	.	197.27
Aniline	C	3	3	10.00	ug/L	3400.00	.	3400.00	164.85	.	164.85
Aniline	D	4	0	10.00	ug/L	220.02	220.02	.	220.02	220.02	.
Aniline	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Aniline	F	5	5	10.00	ug/L	318.00	.	318.00	175.81	.	175.81
Aniline	G	4	3	10.00	ug/L	204.08	306.30	170.00	177.71	306.30	134.85
Anthracene	A	5	5	10.00	ug/L	1720.00	.	1720.00	944.44	.	944.44
Anthracene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Anthracene	C	3	3	10.00	ug/L	3400.00	.	3400.00	814.80	.	814.80
Anthracene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Anthracene	E	5	1	10.00	ug/L	459.47	564.33	40.00	459.47	564.33	40.00
Anthracene	F	5	3	10.00	ug/L	398.16	735.39	173.33	398.16	735.39	173.33
Anthracene	G	4	0	10.00	ug/L	5613.63	5613.63	.	5613.63	5613.63	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Antimony	A	20	1	20.00	ug/L	62.38	61.66	76.00	62.38	61.66	76.00
Antimony	B	2	2	20.00	ug/L	6375.00	.	6375.00	210.09	.	210.09
Antimony	C	3	0	20.00	ug/L	101.67	101.67	.	101.67	101.67	.
Antimony	D	4	4	20.00	ug/L	18.00	.	18.00	18.00	.	18.00
Antimony	E	5	0	20.00	ug/L	115.68	115.68	.	115.68	115.68	.
Antimony	F	5	1	20.00	ug/L	858.40	1068.00	20.00	858.40	1068.00	20.00
Antimony	G	4	1	20.00	ug/L	102.94	130.58	20.00	102.94	130.58	20.00
Arsenic	A	20	0	10.00	ug/L	162.18	162.18	.	162.18	162.18	.
Arsenic	B	2	1	10.00	ug/L	543.50	487.00	600.00	543.50	487.00	600.00
Arsenic	C	3	0	10.00	ug/L	117.00	117.00	.	117.00	117.00	.
Arsenic	D	4	0	10.00	ug/L	97.80	97.80	.	97.80	97.80	.
Arsenic	E	5	1	10.00	ug/L	45.16	55.95	2.00	45.16	55.95	2.00
Arsenic	F	5	0	10.00	ug/L	5942.00	5942.00	.	5942.00	5942.00	.
Arsenic	G	4	0	10.00	ug/L	382.38	382.38	.	382.38	382.38	.
Barium	A	20	0	200.00	ug/L	2801.40	2801.40	.	2801.40	2801.40	.
Barium	B	2	0	200.00	ug/L	1619.00	1619.00	.	1619.00	1619.00	.
Barium	C	3	0	200.00	ug/L	2693.00	2693.00	.	2693.00	2693.00	.
Barium	D	4	0	200.00	ug/L	100.38	100.38	.	100.38	100.38	.
Barium	E	5	0	200.00	ug/L	115.42	115.42	.	115.42	115.42	.
Barium	F	5	0	200.00	ug/L	2726.00	2726.00	.	2726.00	2726.00	.
Barium	G	4	0	200.00	ug/L	1978.50	1978.50	.	1978.50	1978.50	.
Benzene	A	5	0	10.00	ug/L	16400.80	16400.80	.	16400.80	16400.80	.
Benzene	B	2	0	10.00	ug/L	71.86	71.86	.	71.86	71.86	.
Benzene	C	3	0	10.00	ug/L	127.76	127.76	.	127.76	127.76	.
Benzene	D	4	0	10.00	ug/L	431.81	431.81	.	431.81	431.81	.
Benzene	E	5	0	10.00	ug/L	881.28	881.28	.	881.28	881.28	.
Benzene	F	5	0	10.00	ug/L	1053.17	1053.17	.	1053.17	1053.17	.
Benzene	G	4	0	10.00	ug/L	2312.16	2312.16	.	2312.16	2312.16	.
Benzo(a)anthracene	A	5	5	10.00	ug/L	1720.00	.	1720.00	662.98	.	662.98
Benzo(a)anthracene	B	2	2	10.00	ug/L	550.00	.	550.00	451.86	.	451.86
Benzo(a)anthracene	C	3	3	10.00	ug/L	3400.00	.	3400.00	334.57	.	334.57
Benzo(a)anthracene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Benzo(a)anthracene	E	5	0	10.00	ug/L	423.19	423.19	.	423.19	423.19	.
Benzo(a)anthracene	F	5	3	10.00	ug/L	354.34	135.84	500.00	315.08	135.84	434.57
Benzo(a)anthracene	G	4	0	10.00	ug/L	1899.63	1899.63	.	1899.63	1899.63	.
Benzo(a)pyrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	870.97	.	870.97
Benzo(a)pyrene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Benzo(a)pyrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	569.89	.	569.90
Benzo(a)pyrene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Benzo(a)pyrene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Benzo(a)pyrene	F	5	4	10.00	ug/L	327.02	65.12	392.50	327.02	65.12	392.50
Benzo(a)pyrene	G	4	1	10.00	ug/L	1891.79	2389.05	400.00	1891.79	2389.05	400.00
Benzo(b)fluoranthene	A	5	5	10.00	ug/L	1720.00	.	1720.00	783.82	.	783.82
Benzo(b)fluoranthene	B	2	2	10.00	ug/L	550.00	.	550.00	527.38	.	527.39
Benzo(b)fluoranthene	C	3	3	10.00	ug/L	3400.00	.	3400.00	384.92	.	384.92
Benzo(b)fluoranthene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Benzo(b)fluoranthene	E	5	3	10.00	ug/L	59.32	113.31	23.33	59.32	113.31	23.33
Benzo(b)fluoranthene	F	5	4	10.00	ug/L	321.52	37.60	392.50	312.47	37.60	381.19
Benzo(b)fluoranthene	G	4	1	10.00	ug/L	1643.54	2058.05	400.00	1643.54	2058.05	400.00
Benzo(k)fluoranthene	A	5	5	10.00	ug/L	1720.00	.	1720.00	848.16	.	848.16
Benzo(k)fluoranthene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Benzo(k)fluoranthene	C	3	3	10.00	ug/L	3400.00	.	3400.00	493.88	.	493.88
Benzo(k)fluoranthene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Benzo(k)fluoranthene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Benzo(k)fluoranthene	F	5	4	10.00	ug/L	321.52	37.60	392.50	321.52	37.60	392.50
Benzo(k)fluoranthene	G	4	1	10.00	ug/L	1631.40	2041.86	400.00	1631.40	2041.86	400.00

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Benzoic Acid	A	5	2	50.00	ug/L	16199.82	16166.37	16250.00	13710.07	16166.37	10025.62
Benzoic Acid	B	2	2	50.00	ug/L	2750.00	.	2750.00	2750.00	.	2750.00
Benzoic Acid	C	3	0	50.00	ug/L	19716.67	19716.67	.	19716.67	19716.67	.
Benzoic Acid	D	4	0	50.00	ug/L	5860.72	5860.72	.	5860.72	5860.72	.
Benzoic Acid	E	5	0	50.00	ug/L	72327.80	72327.80	.	72327.80	72327.80	.
Benzoic Acid	F	5	0	50.00	ug/L	27372.75	27372.75	.	27372.75	27372.75	.
Benzoic Acid	G	4	0	50.00	ug/L	6419.25	6419.25	.	6419.25	6419.25	.
Benzyl Alcohol	A	5	5	10.00	ug/L	1720.00	.	1720.00	452.83	.	452.83
Benzyl Alcohol	B	2	2	10.00	ug/L	550.00	.	550.00	320.52	.	320.52
Benzyl Alcohol	C	3	2	10.00	ug/L	3515.87	447.60	5050.00	362.88	447.60	320.52
Benzyl Alcohol	D	4	3	10.00	ug/L	17.41	39.65	10.00	17.41	39.65	10.00
Benzyl Alcohol	E	5	2	10.00	ug/L	341.20	542.00	40.00	341.20	542.00	40.00
Benzyl Alcohol	F	5	4	10.00	ug/L	404.44	502.20	380.00	312.65	502.20	265.26
Benzyl Alcohol	G	4	3	10.00	ug/L	325.66	782.66	173.33	325.66	782.66	173.33
Beryllium	A	20	5	5.00	ug/L	35.28	46.90	0.42	35.28	46.90	0.42
Beryllium	B	2	2	5.00	ug/L	63.75	.	63.75	23.19	.	23.19
Beryllium	C	3	1	5.00	ug/L	46.33	54.50	30.00	46.33	54.50	30.00
Beryllium	D	4	4	5.00	ug/L	1.00	.	1.00	1.00	.	1.00
Beryllium	E	5	5	5.00	ug/L	1.00	.	1.00	1.00	.	1.00
Beryllium	F	5	4	5.00	ug/L	1.01	1.04	1.00	1.01	1.04	1.00
Beryllium	G	4	4	5.00	ug/L	1.00	.	1.00	1.00	.	1.00
Biphenyl	A	5	5	10.00	ug/L	1720.00	.	1720.00	905.30	.	905.30
Biphenyl	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Biphenyl	C	3	3	10.00	ug/L	3400.00	.	3400.00	684.33	.	684.33
Biphenyl	D	4	0	10.00	ug/L	40.05	40.05	.	40.05	40.05	.
Biphenyl	E	5	0	10.00	ug/L	2821.92	2821.92	.	2821.92	2821.92	.
Biphenyl	F	5	1	10.00	ug/L	523.49	579.37	300.00	523.49	579.37	300.00
Biphenyl	G	4	2	10.00	ug/L	2755.09	5260.19	250.00	2755.09	5260.19	250.00
Bis(2-ethylhexyl) Phthalate	A	5	4	10.00	ug/L	2308.33	8441.65	775.00	2308.33	8441.65	775.00
Bis(2-ethylhexyl) Phthalate	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Bis(2-ethylhexyl) Phthalate	C	3	0	10.00	ug/L	279928.66	279928.66	.	279928.66	279928.66	.
Bis(2-ethylhexyl) Phthalate	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Bis(2-ethylhexyl) Phthalate	E	5	0	10.00	ug/L	198.21	198.21	.	198.21	198.21	.
Bis(2-ethylhexyl) Phthalate	F	5	3	10.00	ug/L	490.02	475.05	500.00	490.02	475.05	500.00
Bis(2-ethylhexyl) Phthalate	G	4	2	10.00	ug/L	1707.40	3164.80	250.00	1707.40	3164.80	250.00
Boron	A	20	0	100.00	ug/L	45570.00	45570.00	.	45570.00	45570.00	.
Boron	B	2	0	100.00	ug/L	974000.00	974000.00	.	974000.00	974000.00	.
Boron	C	3	0	100.00	ug/L	72585.00	72585.00	.	72585.00	72585.00	.
Boron	D	4	0	100.00	ug/L	2247.50	2247.50	.	2247.50	2247.50	.
Boron	E	5	0	100.00	ug/L	8868.00	8868.00	.	8868.00	8868.00	.
Boron	F	5	0	100.00	ug/L	33530.00	33530.00	.	33530.00	33530.00	.
Boron	G	4	0	100.00	ug/L	38717.50	38717.50	.	38717.50	38717.50	.
Butanone	A	5	2	50.00	ug/L	39276.18	62126.96	5000.0	39276.18	62126.96	5000.00
Butanone	B	2	0	50.00	ug/L	506.40	506.40	.	506.40	506.40	.
Butanone	C	3	0	50.00	ug/L	1193.77	1193.77	.	1193.77	1193.77	.
Butanone	D	4	0	50.00	ug/L	1129.62	1129.62	.	1129.62	1129.62	.
Butanone	E	5	0	50.00	ug/L	1400.40	1400.40	.	1400.40	1400.40	.
Butanone	F	5	0	50.00	ug/L	13465.65	13465.65	.	13465.65	13465.65	.
Butanone	G	4	0	50.00	ug/L	24277.21	24277.21	.	24277.21	24277.21	.
Butyl Benzyl Phthalate	A	5	5	10.00	ug/L	1720.00	.	1720.0	1380.84	.	1380.84
Butyl Benzyl Phthalate	B	2	0	10.00	ug/L	24781.83	24781.83	.	24781.83	24781.83	.
Butyl Benzyl Phthalate	C	3	3	10.00	ug/L	3400.00	.	3400.0	2269.48	.	2269.48
Butyl Benzyl Phthalate	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Butyl Benzyl Phthalate	E	5	5	10.00	ug/L	26.00	.	26.0	26.00	.	26.00
Butyl Benzyl Phthalate	F	5	3	10.00	ug/L	360.15	150.38	500.0	360.15	150.38	500.00
Butyl Benzyl Phthalate	G	4	2	10.00	ug/L	742.95	1235.91	250.0	742.95	1235.91	250.00

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Cadmium	A	20	3	5.00	ug/L	218.82	257.13	1.7	218.82	257.13	1.70
Cadmium	B	2	1	5.00	ug/L	228.75	37.50	420.0	106.35	37.50	175.20
Cadmium	C	3	1	5.00	ug/L	281.67	367.50	110.0	281.67	367.50	110.00
Cadmium	D	4	0	5.00	ug/L	81.63	81.63	.	81.63	81.63	.
Cadmium	E	5	4	5.00	ug/L	5.72	8.60	5.0	5.72	8.60	5.00
Cadmium	F	5	0	5.00	ug/L	79.29	79.29	.	79.29	79.29	.
Cadmium	G	4	0	5.00	ug/L	51.94	51.94	.	51.94	51.94	.
Carbazole	A	5	5	20.00	ug/L	3440.00	.	3440.0	409.74	.	409.74
Carbazole	B	2	2	20.00	ug/L	1100.00	.	1100.0	331.09	.	331.09
Carbazole	C	3	3	20.00	ug/L	6800.00	.	6800.0	287.39	.	287.39
Carbazole	D	4	4	20.00	ug/L	20.00	.	20.0	20.00	.	20.00
Carbazole	E	5	2	20.00	ug/L	133.54	169.23	80.0	133.54	169.23	80.00
Carbazole	F	5	3	20.00	ug/L	642.14	105.36	1000.0	307.01	105.36	441.45
Carbazole	G	4	1	20.00	ug/L	800.69	1000.93	200.0	800.69	1000.93	200.00
Carbon Disulfide	A	5	5	10.00	ug/L	820.00	.	820.0	307.00	.	307.00
Carbon Disulfide	B	2	1	10.00	ug/L	218.98	427.96	10.0	218.98	427.96	10.00
Carbon Disulfide	C	3	0	10.00	ug/L	112.97	112.97	.	112.97	112.97	.
Carbon Disulfide	D	4	3	10.00	ug/L	504.86	1989.44	10.0	504.86	1989.44	10.00
Carbon Disulfide	E	5	1	10.00	ug/L	15.47	16.84	10.0	15.47	16.84	10.00
Carbon Disulfide	F	5	2	10.00	ug/L	527.27	872.12	10.0	527.27	872.12	10.00
Carbon Disulfide	G	4	2	10.00	ug/L	27.24	44.47	10.0	27.24	44.47	10.00
Chlorobenzene	A	5	5	10.00	ug/L	820.00	.	820.0	159.15	.	159.15
Chlorobenzene	B	2	2	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chlorobenzene	C	3	1	10.00	ug/L	77.39	66.09	100.0	77.39	66.09	100.00
Chlorobenzene	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chlorobenzene	E	5	5	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chlorobenzene	F	5	0	10.00	ug/L	154.11	154.11	.	154.11	154.11	.
Chlorobenzene	G	4	0	10.00	ug/L	198.58	198.58	.	198.58	198.58	.
Chloroform	A	5	5	10.00	ug/L	820.00	.	820.0	524.39	.	524.39
Chloroform	B	2	2	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chloroform	C	3	0	10.00	ug/L	322.51	322.51	.	322.51	322.51	.
Chloroform	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chloroform	E	5	5	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chloroform	F	5	0	10.00	ug/L	421.68	421.68	.	421.68	421.68	.
Chloroform	G	4	0	10.00	ug/L	1007.76	1007.76	.	1007.76	1007.76	.
Chromium	A	20	0	10.00	ug/L	1618.98	1618.98	.	1618.98	1618.98	.
Chromium	B	2	0	10.00	ug/L	781.50	781.50	.	781.50	781.50	.
Chromium	C	3	0	10.00	ug/L	4100.33	4100.33	.	4100.33	4100.33	.
Chromium	D	4	0	10.00	ug/L	30.40	30.40	.	30.40	30.40	.
Chromium	E	5	0	10.00	ug/L	44.84	44.84	.	44.84	44.84	.
Chromium	F	5	0	10.00	ug/L	2507.00	2507.00	.	2507.00	2507.00	.
Chromium	G	4	0	10.00	ug/L	1467.00	1467.00	.	1467.00	1467.00	.
Chrysene	A	5	5	10.00	ug/L	1720.00	.	1720.0	835.03	.	835.03
Chrysene	B	2	2	10.00	ug/L	550.00	.	550.0	550.00	.	550.00
Chrysene	C	3	3	10.00	ug/L	3400.00	.	3400.0	450.10	.	450.10
Chrysene	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Chrysene	E	5	0	10.00	ug/L	701.19	701.19	.	701.19	701.19	.
Chrysene	F	5	3	10.00	ug/L	373.55	183.88	500.0	373.55	183.88	500.00
Chrysene	G	4	0	10.00	ug/L	2586.09	2586.09	.	2586.09	2586.09	.
Cobalt	A	20	0	50.00	ug/L	648.93	648.93	.	648.93	648.93	.
Cobalt	B	2	2	50.00	ug/L	999.00	.	999.0	999.00	.	999.00
Cobalt	C	3	2	50.00	ug/L	642.67	868.00	530.0	642.67	868.00	530.00
Cobalt	D	4	2	50.00	ug/L	7.33	8.65	6.0	7.33	8.65	6.00
Cobalt	E	5	4	50.00	ug/L	18.76	53.80	10.0	18.76	53.80	10.00
Cobalt	F	5	0	50.00	ug/L	2133.00	2133.00	.	2133.00	2133.00	.
Cobalt	G	4	0	50.00	ug/L	30903.75	30903.75	.	30903.75	30903.75	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Copper	A	20	0	25.00	ug/L	14135.50	14135.50	.	14135.50	14135.50	.
Copper	B	2	0	25.00	ug/L	1900.00	1900.00	.	1900.00	1900.00	.
Copper	C	3	0	25.00	ug/L	27795.33	27795.33	.	27795.33	27795.33	.
Copper	D	4	1	25.00	ug/L	31.40	26.50	46.1	31.40	26.50	46.10
Copper	E	5	0	25.00	ug/L	956.04	956.04	.	956.04	956.04	.
Copper	F	5	0	25.00	ug/L	3168.00	3168.00	.	3168.00	3168.00	.
Copper	G	4	0	25.00	ug/L	2841.25	2841.25	.	2841.25	2841.25	.
Di-n-butyl Phthalate	A	5	5	10.00	ug/L	1720.00	.	1720.0	293.44	.	293.44
Di-n-butyl Phthalate	B	2	2	10.00	ug/L	550.00	.	550.0	220.90	.	220.90
Di-n-butyl Phthalate	C	3	3	10.00	ug/L	3400.00	.	3400.0	180.60	.	180.60
Di-n-butyl Phthalate	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Di-n-butyl Phthalate	E	5	4	10.00	ug/L	42.34	121.68	22.5	42.34	121.68	22.50
Di-n-butyl Phthalate	F	5	4	10.00	ug/L	337.39	116.94	392.5	205.75	116.94	227.95
Di-n-butyl Phthalate	G	4	2	10.00	ug/L	466.54	683.08	250.0	451.99	683.08	220.90
Dibenzofuran	A	5	5	10.00	ug/L	1720.00	.	1720.0	1012.76	.	1012.76
Dibenzofuran	B	2	2	10.00	ug/L	550.00	.	550.0	550.00	.	550.00
Dibenzofuran	C	3	3	10.00	ug/L	3400.00	.	3400.0	1042.52	.	1042.52
Dibenzofuran	D	4	4	10.00	ug/L	10.00	.	10.0	10.00	.	10.00
Dibenzofuran	E	5	5	10.00	ug/L	26.00	.	26.0	26.00	.	26.00
Dibenzofuran	F	5	4	10.00	ug/L	327.46	117.30	380.0	327.46	117.30	380.00
Dibenzofuran	G	4	0	10.00	ug/L	4286.00	4286.00	.	4286.00	4286.00	.
Dibenzothiophene	A	5	5	10.00	ug/L	1720.00	.	1720	824.48	.	824.48
Dibenzothiophene	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Dibenzothiophene	C	3	3	10.00	ug/L	3400.00	.	3400	414.94	.	414.94
Dibenzothiophene	D	4	4	10.00	ug/L	10.00	.	10	10.00	.	10.00
Dibenzothiophene	E	5	0	10.00	ug/L	815.35	815.35	.	815.35	815.35	.
Dibenzothiophene	F	5	5	10.00	ug/L	318.00	.	318	318.00	.	318.00
Dibenzothiophene	G	4	0	10.00	ug/L	1662.37	1662.37	.	1662.37	1662.37	.
Diethyl Phthalate	A	5	5	10.00	ug/L	1720.00	.	1720	939.50	.	939.50
Diethyl Phthalate	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Diethyl Phthalate	C	3	3	10.00	ug/L	3400.00	.	3400	798.33	.	798.33
Diethyl Phthalate	D	4	4	10.00	ug/L	10.00	.	10	10.00	.	10.00
Diethyl Phthalate	E	5	2	10.00	ug/L	366.27	593.78	25	366.27	593.78	25.00
Diethyl Phthalate	F	5	1	10.00	ug/L	3916.63	4645.78	1000	3916.63	4645.78	1000.00
Diethyl Phthalate	G	4	1	10.00	ug/L	1078.81	1305.08	400	1078.81	1305.08	400.00
Diphenyl Ether	A	5	5	10.00	ug/L	1720.00	.	1720	1328.05	.	1328.05
Diphenyl Ether	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Diphenyl Ether	C	3	3	10.00	ug/L	3400.00	.	3400	2093.49	.	2093.49
Diphenyl Ether	D	4	4	10.00	ug/L	10.00	.	10	10.00	.	10.00
Diphenyl Ether	E	5	0	10.00	ug/L	9229.70	9229.70	.	9229.70	9229.70	.
Diphenyl Ether	F	5	4	10.00	ug/L	333.86	149.30	380	333.86	149.30	380.00
Diphenyl Ether	G	4	3	10.00	ug/L	203.40	303.59	170	203.40	303.59	170.00
Ethylbenzene	A	5	0	10.00	ug/L	12647.80	12647.80	.	12647.80	12647.80	.
Ethylbenzene	B	2	0	10.00	ug/L	215.90	215.90	.	215.90	215.90	.
Ethylbenzene	C	3	0	10.00	ug/L	820.00	820.00	.	820.00	820.00	.
Ethylbenzene	D	4	0	10.00	ug/L	97.18	97.18	.	97.18	97.18	.
Ethylbenzene	E	5	0	10.00	ug/L	794.14	794.14	.	794.14	794.14	.
Ethylbenzene	F	5	0	10.00	ug/L	1585.12	1585.12	.	1585.12	1585.12	.
Ethylbenzene	G	4	0	10.00	ug/L	7096.11	7096.11	.	7096.11	7096.11	.
Fluoranthene	A	5	5	10.00	ug/L	1720.00	.	1720	999.94	.	999.94
Fluoranthene	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Fluoranthene	C	3	3	10.00	ug/L	3400.00	.	3400	999.81	.	999.81
Fluoranthene	D	4	4	10.00	ug/L	10.00	.	10	10.00	.	10.00
Fluoranthene	E	5	0	10.00	ug/L	279.73	279.73	.	279.73	279.73	.
Fluoranthene	F	5	1	10.00	ug/L	892.90	1066.13	200	892.90	1066.13	200.00
Fluoranthene	G	4	0	10.00	ug/L	8867.33	8867.33	.	8867.33	8867.33	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Fluorene	A	5	5	10.00	ug/L	1720.00	.	1720	909.39	.	909.39
Fluorene	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Fluorene	C	3	3	10.00	ug/L	3400.00	.	3400	697.96	.	697.96
Fluorene	D	4	4	10.00	ug/L	10.00	.	10	10.00	.	10.00
Fluorene	E	5	2	10.00	ug/L	167.68	252.79	40	167.68	252.79	40.00
Fluorene	F	5	3	10.00	ug/L	356.67	141.68	500	356.67	141.68	500.00
Fluorene	G	4	0	10.00	ug/L	5199.70	5199.70	.	5199.70	5199.70	.
Germanium	B	2	2	500.00	ug/L	53125.00	.	53125	8777.50	.	8777.50
Germanium	C	3	1	500.00	ug/L	10146.67	11305.00	7830	10146.67	11305.00	7830.00
Germanium	E	5	5	500.00	ug/L	500.00	.	500	500.00	.	500.00
Germanium	F	5	5	500.00	ug/L	500.00	.	500	500.00	.	500.00
Germanium	G	4	4	500.00	ug/L	500.00	.	500	500.00	.	500.00
Hexanoic Acid	A	5	1	10.00	ug/L	6698.58	8348.22	100	6698.58	8348.22	100.00
Hexanoic Acid	B	2	2	10.00	ug/L	550.00	.	550	550.00	.	550.00
Hexanoic Acid	C	3	0	10.00	ug/L	5613.10	5613.10	.	5613.10	5613.10	.
Hexanoic Acid	D	4	0	10.00	ug/L	2104.34	2104.34	.	2104.34	2104.34	.
Hexanoic Acid	E	5	0	10.00	ug/L	41560.56	41560.56	.	41560.56	41560.56	.
Hexanoic Acid	F	5	0	10.00	ug/L	10988.88	10988.88	.	10988.88	10988.88	.
Hexanoic Acid	G	4	3	10.00	ug/L	440.09	1640.37	40	440.09	1640.37	40.00
Iron	A	20	0	100.00	ug/L	190030.00	190030.00	.	190030.00	190030.00	.
Iron	B	2	0	100.00	ug/L	83300.00	83300.00	.	83300.00	83300.00	.
Iron	C	3	0	100.00	ug/L	401870.00	401870.00	.	401870.00	401870.00	.
Iron	D	4	0	100.00	ug/L	2631.00	2631.00	.	2631.00	2631.00	.
Iron	E	5	0	100.00	ug/L	8575.00	8575.00	.	8575.00	8575.00	.
Iron	F	5	0	100.00	ug/L	350580.00	350580.00	.	350580.00	350580.00	.
Iron	G	4	0	100.00	ug/L	77200.00	77200.00	.	77200.00	77200.00	.
Lead	A	20	0	50.00	ug/L	9939.25	9939.25	.	9939.25	9939.25	.
Lead	B	2	0	50.00	ug/L	1468.50	1468.50	.	1468.50	1468.50	.
Lead	C	3	1	50.00	ug/L	9623.00	13464.50	1940	9623.00	13464.50	1940.00
Lead	D	4	0	50.00	ug/L	45.68	45.68	.	45.68	45.68	.
Lead	E	5	0	50.00	ug/L	177.60	177.60	.	177.60	177.60	.
Lead	F	5	0	50.00	ug/L	2234.00	2234.00	.	2234.00	2234.00	.
Lead	G	4	0	50.00	ug/L	1974.25	1974.25	.	1974.25	1974.25	.
Lithium	B	2	2	100.00	ug/L	10625.00	.	10625	1286.05	.	1286.05
Lithium	C	3	3	100.00	ug/L	2910.00	.	2910	1322.09	.	1322.09
Lithium	E	5	5	100.00	ug/L	100.00	.	100	100.00	.	100.00
Lithium	F	5	0	100.00	ug/L	761.00	761.00	.	761.00	761.00	.
Lithium	G	4	0	100.00	ug/L	2458.00	2458.00	.	2458.00	2458.00	.
Lutetium	B	2	2	100.00	ug/L	10625.00	.	10625	1247.00	.	1247.00
Lutetium	C	3	0	100.00	ug/L	1247.00	1247.00	.	1247.00	1247.00	.
Lutetium	E	5	5	100.00	ug/L	100.00	.	100	100.00	.	100.00
Lutetium	F	5	5	100.00	ug/L	100.00	.	100	100.00	.	100.00
Lutetium	G	4	4	100.00	ug/L	100.00	.	100	100.00	.	100.00
M-xylene	A	5	0	10.00	ug/L	20696.72	20696.72	.	20696.72	20696.72	.
M-xylene	B	2	0	10.00	ug/L	207.79	207.79	.	207.79	207.79	.
M-xylene	C	3	0	10.00	ug/L	3250.70	3250.70	.	3250.70	3250.70	.
M-xylene	D	4	0	10.00	ug/L	189.85	189.85	.	189.85	189.85	.
M-xylene	E	5	0	10.00	ug/L	791.01	791.01	.	791.01	791.01	.
M-xylene	F	5	3	10.00	ug/L	1971.00	4912.50	10	1971.00	4912.50	10.00
M-xylene	G	4	2	10.00	ug/L	5395.13	10780.25	10	5395.13	10780.25	10.00
Magnesium	A	20	0	5000.00	ug/L	43422.50	43422.50	.	43422.50	43422.50	.
Magnesium	B	2	0	5000.00	ug/L	24000.00	24000.00	.	24000.00	24000.00	.
Magnesium	C	3	0	5000.00	ug/L	180886.67	180886.67	.	180886.67	180886.67	.
Magnesium	D	4	0	5000.00	ug/L	578500.00	578500.00	.	578500.00	578500.00	.
Magnesium	E	5	0	5000.00	ug/L	6329.00	6329.00	.	6329.00	6329.00	.
Magnesium	F	5	0	5000.00	ug/L	102480.00	102480.00	.	102480.00	102480.00	.
Magnesium	G	4	0	5000.00	ug/L	59637.50	59637.50	.	59637.50	59637.50	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Manganese	A	20	0	15.00	ug/L	4789.75	4789.75	.	4789.75	4789.75	.
Manganese	B	2	0	15.00	ug/L	2200.00	2200.00	.	2200.00	2200.00	.
Manganese	C	3	0	15.00	ug/L	15175.33	15175.33	.	15175.33	15175.33	.
Manganese	D	4	0	15.00	ug/L	5930.00	5930.00	.	5930.00	5930.00	.
Manganese	E	5	0	15.00	ug/L	749.40	749.40	.	749.40	749.40	.
Manganese	F	5	0	15.00	ug/L	9340.00	9340.00	.	9340.00	9340.00	.
Manganese	G	4	0	15.00	ug/L	12972.50	12972.50	.	12972.50	12972.50	.
Mercury	A	20	0	0.20	ug/L	2.37	2.37	.	2.37	2.37	.
Mercury	B	2	1	0.20	ug/L	1.19	0.38	2.0	1.19	0.38	2.00
Mercury	C	3	1	0.20	ug/L	3.96	4.94	2.0	3.96	4.94	2.00
Mercury	D	4	3	0.20	ug/L	0.68	2.10	0.2	0.68	2.10	0.20
Mercury	E	5	3	0.20	ug/L	0.25	0.34	0.2	0.25	0.34	0.20
Mercury	F	5	0	0.20	ug/L	10.38	10.38	.	10.38	10.38	.
Mercury	G	4	0	0.20	ug/L	19.81	19.81	.	19.81	19.81	.
Methylene Chloride	A	5	2	10.00	ug/L	2653.78	3756.30	1000.0	2653.78	3756.30	1000.00
Methylene Chloride	B	2	0	10.00	ug/L	382.91	382.91	.	382.91	382.91	.
Methylene Chloride	C	3	0	10.00	ug/L	234.99	234.99	.	234.99	234.99	.
Methylene Chloride	D	4	0	10.00	ug/L	40.27	40.27	.	40.27	40.27	.
Methylene Chloride	E	5	0	10.00	ug/L	57.08	57.08	.	57.08	57.08	.
Methylene Chloride	F	5	1	10.00	ug/L	4500.62	5623.27	10.0	4500.62	5623.27	10.00
Methylene Chloride	G	4	0	10.00	ug/L	5788.27	5788.27	.	5788.27	5788.27	.
Molybdenum	A	20	0	10.00	ug/L	1575.70	1575.70	.	1575.70	1575.70	.
Molybdenum	B	2	0	10.00	ug/L	7515.00	7515.00	.	7515.00	7515.00	.
Molybdenum	C	3	1	10.00	ug/L	2518.67	3503.00	550.0	2518.67	3503.00	550.00
Molybdenum	D	4	3	10.00	ug/L	8.30	15.20	6.0	8.30	15.20	6.00
Molybdenum	E	5	0	10.00	ug/L	627.40	627.40	.	627.40	627.40	.
Molybdenum	F	5	0	10.00	ug/L	3334.00	3334.00	.	3334.00	3334.00	.
Molybdenum	G	4	0	10.00	ug/L	1405.88	1405.88	.	1405.88	1405.88	.
N-decane	A	5	0	10.00	ug/L	67283.40	67283.40	.	67283.40	67283.40	.
N-decane	B	2	2	10.00	ug/L	550.00	.	550.0	550.00	.	550.00
N-decane	C	3	0	10.00	ug/L	193443.61	193443.61	.	193443.61	193443.61	.
N-decane	D	4	0	10.00	ug/L	88.82	88.82	.	88.82	88.82	.
N-decane	E	5	1	10.00	ug/L	3351.70	4187.13	10.0	3351.70	4187.13	10.00
N-decane	F	5	1	10.00	ug/L	6157.36	7621.70	300.0	6157.36	7621.70	300.00
N-decane	G	4	0	10.00	ug/L	94097.42	94097.42	.	94097.42	94097.42	.
N-docosane	A	5	2	10.00	ug/L	2866.38	2610.63	3250.0	2015.04	2610.63	1121.65
N-docosane	B	2	2	10.00	ug/L	550.00	.	550.0	550.00	.	550.00
N-docosane	C	3	1	10.00	ug/L	3443.68	165.52	10000.0	605.89	165.52	1486.62
N-docosane	D	4	0	10.00	ug/L	25.78	25.78	.	25.78	25.78	.
N-docosane	E	5	1	10.00	ug/L	478.49	593.11	20.0	478.49	593.11	20.00
N-docosane	F	5	2	10.00	ug/L	872.67	1021.12	650.0	872.67	1021.12	650.00
N-docosane	G	4	2	10.00	ug/L	4153.82	8057.65	250.0	4153.82	8057.65	250.00
N-dodecane	A	5	0	10.00	ug/L	43124.00	43124.00	.	43124.00	43124.00	.
N-dodecane	B	2	1	10.00	ug/L	7362.65	13725.30	1000.0	7362.65	13725.30	1000.00
N-dodecane	C	3	1	10.00	ug/L	157856.91	236735.36	100.0	157856.91	236735.36	100.00
N-dodecane	D	4	0	10.00	ug/L	163.87	163.87	.	163.87	163.87	.
N-dodecane	E	5	1	10.00	ug/L	6676.20	8335.25	40.0	6676.20	8335.25	40.00
N-dodecane	F	5	0	10.00	ug/L	23565.56	23565.56	.	23565.56	23565.56	.
N-dodecane	G	4	1	10.00	ug/L	65739.50	87619.34	100.0	65739.50	87619.34	100.00

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
N-eicosane	A	5	0	10.00	ug/L	20641.71	20641.71	.	20641.71	20641.71	.
N-eicosane	B	2	0	10.00	ug/L	1755.73	1755.73	.	1755.73	1755.73	.
N-eicosane	C	3	0	10.00	ug/L	106713.64	106713.64	.	106713.64	106713.64	.
N-eicosane	D	4	0	10.00	ug/L	80.44	80.44	.	80.44	80.44	.
N-eicosane	E	5	1	10.00	ug/L	1013.91	1257.39	40.00	1013.91	1257.39	40.00
N-eicosane	F	5	1	10.00	ug/L	4734.04	5842.55	300.00	4734.04	5842.55	300.00
N-eicosane	G	4	0	10.00	ug/L	16508.48	16508.48	.	16508.48	16508.48	.
N-hexacosane	A	5	1	10.00	ug/L	2925.34	2281.67	5500.00	2139.49	2281.67	1570.73
N-hexacosane	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
N-hexacosane	C	3	1	10.00	ug/L	3509.20	263.80	10000.00	889.69	263.80	2141.45
N-hexacosane	D	4	3	10.00	ug/L	11.48	15.92	10.00	11.48	15.92	10.00
N-hexacosane	E	5	4	10.00	ug/L	28.18	30.92	27.50	28.18	30.92	27.50
N-hexacosane	F	5	4	10.00	ug/L	2030.20	9561.00	147.50	2030.20	9561.00	147.50
N-hexacosane	G	4	4	10.00	ug/L	132.50	.	132.50	132.50	.	132.50
N-hexadecane	A	5	1	10.00	ug/L	26302.30	32852.87	100.00	26302.30	32852.87	100.00
N-hexadecane	B	2	0	10.00	ug/L	14877.80	14877.80	.	14877.80	14877.80	.
N-hexadecane	C	3	0	10.00	ug/L	456985.75	456985.75	.	456985.75	456985.75	.
N-hexadecane	D	4	0	10.00	ug/L	429.93	429.93	.	429.93	429.93	.
N-hexadecane	E	5	1	10.00	ug/L	73600.00	91990.00	40.00	73600.00	91990.00	40.00
N-hexadecane	F	5	0	10.00	ug/L	11036.54	11036.54	.	11036.54	11036.54	.
N-hexadecane	G	4	0	10.00	ug/L	65676.48	65676.48	.	65676.48	65676.48	.
N-octadecane	A	5	2	10.00	ug/L	7391.46	11652.43	1000.00	7391.46	11652.43	1000.00
N-octadecane	B	2	1	10.00	ug/L	6907.55	13715.10	100.00	6907.55	13715.10	100.00
N-octadecane	C	3	0	10.00	ug/L	300956.57	300956.57	.	300956.57	300956.57	.
N-octadecane	D	4	0	10.00	ug/L	69.51	69.51	.	69.51	69.51	.
N-octadecane	E	5	0	10.00	ug/L	7235.35	7235.35	.	7235.35	7235.35	.
N-octadecane	F	5	0	10.00	ug/L	6906.68	6906.68	.	6906.68	6906.68	.
N-octadecane	G	4	0	10.00	ug/L	39607.26	39607.26	.	39607.26	39607.26	.
N-tetracosane	A	5	2	10.00	ug/L	4483.55	6805.92	1000.00	3754.71	5591.18	1000.00
N-tetracosane	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
N-tetracosane	C	3	2	10.00	ug/L	3437.53	212.59	5050.00	1008.05	212.59	1405.78
N-tetracosane	D	4	0	10.00	ug/L	26.84	26.84	.	26.84	26.84	.
N-tetracosane	E	5	4	10.00	ug/L	83.94	309.69	27.50	83.94	309.69	27.50
N-tetracosane	F	5	5	10.00	ug/L	318.00	.	318.00	318.00	.	318.00
N-tetracosane	G	4	3	10.00	ug/L	1719.78	6359.14	173.33	1719.78	6359.14	173.33
N-tetradecane	A	5	2	10.00	ug/L	10106.30	16177.17	1000.00	10106.30	16177.17	1000.00
N-tetradecane	B	2	0	10.00	ug/L	107047.15	107047.15	.	107047.15	107047.15	.
N-tetradecane	C	3	0	10.00	ug/L	854184.38	854184.38	.	854184.38	854184.38	.
N-tetradecane	D	4	0	10.00	ug/L	106.15	106.15	.	106.15	106.15	.
N-tetradecane	E	5	0	10.00	ug/L	120070.00	120070.00	.	120070.00	120070.00	.
N-tetradecane	F	5	0	10.00	ug/L	20623.52	20623.52	.	20623.52	20623.52	.
N-tetradecane	G	4	0	10.00	ug/L	85899.52	85899.52	.	85899.52	85899.52	.
N,N-dimethylformamide	A	5	5	10.00	ug/L	1720.00	.	1720.00	306.27	.	306.27
N,N-dimethylformamide	B	2	2	10.00	ug/L	550.00	.	550.00	228.92	.	228.92
N,N-dimethylformamide	C	3	3	10.00	ug/L	3400.00	.	3400.00	185.95	.	185.95
N,N-dimethylformamide	D	4	0	10.00	ug/L	135.38	135.38	.	135.38	135.38	.
N,N-dimethylformamide	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
N,N-dimethylformamide	F	5	4	10.00	ug/L	464.55	802.75	380.00	336.12	802.75	219.46
N,N-dimethylformamide	G	4	4	10.00	ug/L	132.50	.	132.50	121.96	.	121.96

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Naphthalene	A	5	3	10.00	ug/L	3645.41	8063.52	700.00	3457.54	7593.86	700.00
Naphthalene	B	2	0	10.00	ug/L	4168.47	4168.47	.	4168.47	4168.47	.
Naphthalene	C	3	0	10.00	ug/L	18127.58	18127.58	.	18127.58	18127.58	.
Naphthalene	D	4	0	10.00	ug/L	242.44	242.44	.	242.44	242.44	.
Naphthalene	E	5	0	10.00	ug/L	1851.62	1851.62	.	1851.62	1851.62	.
Naphthalene	F	5	0	10.00	ug/L	6612.13	6612.13	.	6612.13	6612.13	.
Naphthalene	G	4	0	10.00	ug/L	25478.36	25478.36	.	25478.36	25478.36	.
Nickel	A	20	0	40.00	ug/L	50213.50	50213.50	.	50213.50	50213.50	.
Nickel	B	2	1	40.00	ug/L	1216.50	313.00	2120.00	1216.50	313.00	2120.00
Nickel	C	3	0	40.00	ug/L	3642.00	3642.00	.	3642.00	3642.00	.
Nickel	D	4	0	40.00	ug/L	203.50	203.50	.	203.50	203.50	.
Nickel	E	5	0	40.00	ug/L	198.22	198.22	.	198.22	198.22	.
Nickel	F	5	0	40.00	ug/L	2055.00	2055.00	.	2055.00	2055.00	.
Nickel	G	4	0	40.00	ug/L	2987.75	2987.75	.	2987.75	2987.75	.
o+p Xylene	A	5	0	10.00	ug/L	9328.55	9328.55	.	9328.55	9328.55	.
o+p Xylene	B	2	0	10.00	ug/L	95.65	95.65	.	95.65	95.65	.
o+p Xylene	C	3	0	10.00	ug/L	1687.32	1687.32	.	1687.32	1687.32	.
o+p Xylene	D	4	0	10.00	ug/L	110.44	110.44	.	110.44	110.44	.
o+p Xylene	E	5	0	10.00	ug/L	1087.85	1087.85	.	1087.85	1087.85	.
o+p Xylene	F	5	3	10.00	ug/L	3253.70	8119.25	10.00	3253.70	8119.25	10.00
o+p Xylene	G	4	2	10.00	ug/L	6816.50	13623.00	10.00	6816.50	13623.00	10.00
o-cresol	A	5	5	10.00	ug/L	1720.00	.	1720.00	893.95	.	893.95
o-cresol	B	2	1	10.00	ug/L	3604.55	7109.10	100.00	3604.55	7109.10	100.00
o-cresol	C	3	3	10.00	ug/L	3400.00	.	3400.00	646.52	.	646.52
o-cresol	D	4	0	10.00	ug/L	190.25	190.25	.	190.25	190.25	.
o-cresol	E	5	1	10.00	ug/L	2242.57	2793.21	40.00	2242.57	2793.21	40.00
o-cresol	F	5	4	10.00	ug/L	370.24	281.22	392.50	370.24	281.22	392.50
o-cresol	G	4	3	10.00	ug/L	321.10	854.41	143.33	321.10	854.41	143.33
p-cresol	A	5	5	10.00	ug/L	1720.00	.	1720.00	851.97	.	851.97
p-cresol	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
p-cresol	C	3	0	10.00	ug/L	1101.24	1101.24	.	1101.24	1101.24	.
p-cresol	D	4	0	10.00	ug/L	1365.47	1365.47	.	1365.47	1365.47	.
p-cresol	E	5	0	10.00	ug/L	1529.10	1529.10	.	1529.10	1529.10	.
p-cresol	F	5	2	10.00	ug/L	784.83	941.38	550.00	784.83	941.38	550.00
p-cresol	G	4	1	10.00	ug/L	1361.08	1781.43	100.00	1361.08	1781.43	100.00
p-cymene	A	5	5	10.00	ug/L	1720.00	.	1720.00	831.41	.	831.41
p-cymene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
p-cymene	C	3	3	10.00	ug/L	3400.00	.	3400.00	438.03	.	438.03
p-cymene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
p-cymene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
p-cymene	F	5	2	10.00	ug/L	580.24	800.40	250.00	580.24	800.40	250.00
p-cymene	G	4	1	10.00	ug/L	1479.65	1939.53	100.00	1479.65	1939.53	100.00
Pentamethylbenzene	A	5	4	10.00	ug/L	3757.20	11186.00	1900.00	3028.51	11186.00	989.14
Pentamethylbenzene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Pentamethylbenzene	C	3	3	10.00	ug/L	3400.00	.	3400.00	971.05	.	971.05
Pentamethylbenzene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Pentamethylbenzene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Pentamethylbenzene	F	5	3	10.00	ug/L	350.47	126.18	500.00	350.47	126.18	500.00
Pentamethylbenzene	G	4	0	10.00	ug/L	3151.33	3151.33	.	3151.33	3151.33	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Phenanthrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	1257.35	.	1257.35
Phenanthrene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Phenanthrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	1857.82	.	1857.82
Phenanthrene	D	4	0	10.00	ug/L	19.55	19.55	.	19.55	19.55	.
Phenanthrene	E	5	0	10.00	ug/L	3755.32	3755.32	.	3755.32	3755.32	.
Phenanthrene	F	5	0	10.00	ug/L	3099.13	3099.13	.	3099.13	3099.13	.
Phenanthrene	G	4	0	10.00	ug/L	18468.31	18468.31	.	18468.31	18468.31	.
Phenol	A	5	3	10.00	ug/L	2302.56	2006.39	2500.00	2302.56	2006.39	2500.00
Phenol	B	2	0	10.00	ug/L	7547.35	7547.35	.	7547.35	7547.35	.
Phenol	C	3	0	10.00	ug/L	4914.50	4914.50	.	4914.50	4914.50	.
Phenol	D	4	0	10.00	ug/L	3026.83	3026.83	.	3026.83	3026.83	.
Phenol	E	5	0	10.00	ug/L	36046.00	36046.00	.	36046.00	36046.00	.
Phenol	F	5	0	10.00	ug/L	10575.38	10575.38	.	10575.38	10575.38	.
Phenol	G	4	0	10.00	ug/L	6817.00	6817.00	.	6817.00	6817.00	.
Phosphorus	C	3	0	1000.00	ug/L	91583.33	91583.33	.	91583.33	91583.33	.
Phosphorus	E	5	0	1000.00	ug/L	22986.60	22986.60	.	22986.60	22986.60	.
Phosphorus	F	5	0	1000.00	ug/L	83770.00	83770.00	.	83770.00	83770.00	.
Phosphorus	G	4	0	1000.00	ug/L	69025.00	69025.00	.	69025.00	69025.00	.
Pyrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	1039.02	.	1039.02
Pyrene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
Pyrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	1130.08	.	1130.08
Pyrene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Pyrene	E	5	0	10.00	ug/L	2448.05	2448.05	.	2448.05	2448.05	.
Pyrene	F	5	2	10.00	ug/L	830.67	984.45	600.00	830.67	984.45	600.00
Pyrene	G	4	0	10.00	ug/L	6926.59	6926.59	.	6926.59	6926.59	.
Pyridine	A	5	5	10.00	ug/L	1720.00	.	1720.00	386.23	.	386.23
Pyridine	B	2	2	10.00	ug/L	550.00	.	550.00	278.90	.	278.90
Pyridine	C	3	2	10.00	ug/L	3426.92	180.77	5050.00	246.19	180.77	278.90
Pyridine	D	4	3	10.00	ug/L	12.48	19.91	10.00	12.48	19.91	10.00
Pyridine	E	5	3	10.00	ug/L	38.21	45.52	33.33	38.21	45.52	33.33
Pyridine	F	5	2	10.00	ug/L	795.36	892.27	650.00	686.92	892.27	378.90
Pyridine	G	4	2	10.00	ug/L	425.64	601.29	250.00	425.64	601.29	250.00
Selenium	A	20	7	5.00	ug/L	19.93	29.00	3.09	19.93	29.00	3.09
Selenium	B	2	2	5.00	ug/L	180.00	.	180.00	84.95	.	84.95
Selenium	C	3	3	5.00	ug/L	25.00	.	25.00	25.00	.	25.00
Selenium	D	4	3	5.00	ug/L	37.45	80.80	23.00	37.45	80.80	23.00
Selenium	E	5	5	5.00	ug/L	20.00	.	20.00	20.00	.	20.00
Selenium	F	5	0	5.00	ug/L	170.46	170.46	.	170.46	170.46	.
Selenium	G	4	0	5.00	ug/L	346.28	346.28	.	346.28	346.28	.
Silicon	B	2	0	100.00	ug/L	31350.00	31350.00	.	31350.00	31350.00	.
Silicon	C	3	0	100.00	ug/L	38660.67	38660.67	.	38660.67	38660.67	.
Silicon	E	5	0	100.00	ug/L	6065.00	6065.00	.	6065.00	6065.00	.
Silicon	F	5	0	100.00	ug/L	62670.00	62670.00	.	62670.00	62670.00	.
Silicon	G	4	0	100.00	ug/L	29087.50	29087.50	.	29087.50	29087.50	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
Silver	A	20	0	10.00	ug/L	156.44	156.44	.	156.44	156.44	.
Silver	B	2	2	10.00	ug/L	531.25	.	531.25	188.47	.	188.47
Silver	C	3	2	10.00	ug/L	2973.33	7740.00	590.00	2789.62	7740.00	314.43
Silver	D	4	4	10.00	ug/L	3.00	.	3.00	3.00	.	3.00
Silver	E	5	5	10.00	ug/L	5.00	.	5.00	5.00	.	5.00
Silver	F	5	0	10.00	ug/L	19.34	19.34	.	19.34	19.34	.
Silver	G	4	0	10.00	ug/L	13.08	13.08	.	13.08	13.08	.
Strontium	B	2	2	100.00	ug/L	10625.00	.	10625.00	1376.17	.	1376.17
Strontium	C	3	0	100.00	ug/L	1978.00	1978.00	.	1978.00	1978.00	.
Strontium	E	5	4	100.00	ug/L	105.60	128.00	100.00	105.60	128.00	100.00
Strontium	F	5	0	100.00	ug/L	1709.00	1709.00	.	1709.00	1709.00	.
Strontium	G	4	0	100.00	ug/L	1441.88	1441.88	.	1441.88	1441.88	.
Styrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	410.22	.	410.22
Styrene	B	2	2	10.00	ug/L	550.00	.	550.00	293.89	.	293.89
Styrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	229.26	.	229.26
Styrene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Styrene	E	5	5	10.00	ug/L	26.00	.	26.00	26.00	.	26.00
Styrene	F	5	2	10.00	ug/L	491.05	385.08	650.00	388.60	385.08	393.89
Styrene	G	4	2	10.00	ug/L	443.69	637.38	250.00	443.69	637.38	250.00
Sulfur	C	3	0	1000.00	ug/L	1952700.00	1952700.00	.	1952700.00	1952700.00	.
Sulfur	E	5	0	1000.00	ug/L	151420.00	151420.00	.	151420.00	151420.00	.
Sulfur	F	5	0	1000.00	ug/L	1802000.00	1802000.00	.	1802000.00	1802000.00	.
Sulfur	G	4	0	1000.00	ug/L	2406250.00	2406250.00	.	2406250.00	2406250.00	.
Tetrachloroethene	A	5	2	10.00	ug/L	1148.47	1247.45	1000.00	1148.47	1247.45	1000.00
Tetrachloroethene	B	2	0	10.00	ug/L	7038.50	7038.50	.	7038.50	7038.50	.
Tetrachloroethene	C	3	0	10.00	ug/L	597.95	597.95	.	597.95	597.95	.
Tetrachloroethene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Tetrachloroethene	E	5	3	10.00	ug/L	34.25	70.62	10.00	34.25	70.62	10.00
Tetrachloroethene	F	5	0	10.00	ug/L	1223.02	1223.02	.	1223.02	1223.02	.
Tetrachloroethene	G	4	0	10.00	ug/L	2615.46	2615.46	.	2615.46	2615.46	.
Tin	A	20	0	30.00	ug/L	817.75	817.75	.	817.75	817.75	.
Tin	B	2	2	30.00	ug/L	4250.00	.	4250.00	767.26	.	767.26
Tin	C	3	2	30.00	ug/L	2812.00	6216.00	1110.00	2761.68	6216.00	1034.51
Tin	D	4	2	30.00	ug/L	118.50	152.00	85.00	118.50	152.00	85.00
Tin	E	5	5	30.00	ug/L	28.00	.	28.00	28.00	.	28.00
Tin	F	5	0	30.00	ug/L	1348.90	1348.90	.	1348.90	1348.90	.
Tin	G	4	1	30.00	ug/L	1132.75	1500.67	29.00	1132.75	1500.67	29.00
Titanium	A	20	0	5.00	ug/L	383.24	383.24	.	383.24	383.24	.
Titanium	B	2	2	5.00	ug/L	210.00	.	210.00	189.40	.	189.40
Titanium	C	3	2	5.00	ug/L	502.33	1407.00	50.00	502.33	1407.00	50.00
Titanium	D	4	4	5.00	ug/L	10.00	.	10.00	10.00	.	10.00
Titanium	E	5	4	5.00	ug/L	8.96	28.80	4.00	8.96	28.80	4.00
Titanium	F	5	0	5.00	ug/L	427.00	427.00	.	427.00	427.00	.
Titanium	G	4	0	5.00	ug/L	177.13	177.13	.	177.13	177.13	.
Toluene	A	5	0	10.00	ug/L	66687.90	66687.90	.	66687.90	66687.90	.
Toluene	B	2	0	10.00	ug/L	860.29	860.29	.	860.29	860.29	.
Toluene	C	3	0	10.00	ug/L	1458.72	1458.72	.	1458.72	1458.72	.
Toluene	D	4	0	10.00	ug/L	400.14	400.14	.	400.14	400.14	.
Toluene	E	5	0	10.00	ug/L	4030.87	4030.87	.	4030.87	4030.87	.
Toluene	F	5	0	10.00	ug/L	9407.42	9407.42	.	9407.42	9407.42	.
Toluene	G	4	0	10.00	ug/L	22499.40	22499.40	.	22499.40	22499.40	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replace Mean of NDs
Trichloroethene	A	5	4	10.00	ug/L	837.09	185.47	1000.00	737.28	185.47	875.24
Trichloroethene	B	2	1	10.00	ug/L	15.52	21.04	10.00	15.52	21.04	10.00
Trichloroethene	C	3	3	10.00	ug/L	40.00	.	40.00	40.00	.	40.00
Trichloroethene	D	4	0	10.00	ug/L	38.73	38.73	.	38.73	38.73	.
Trichloroethene	E	5	5	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
Trichloroethene	F	5	0	10.00	ug/L	559.08	559.08	.	559.08	559.08	.
Trichloroethene	G	4	0	10.00	ug/L	2606.47	2606.47	.	2606.47	2606.47	.
Tripropyleneglycol Methyl Ether	A	5	1	99.00	ug/L	135980.76	167500.95	9900.00	133494.12	164392.65	9900.00
Tripropyleneglycol Methyl Ether	B	2	2	99.00	ug/L	5445.00	.	5445.00	5445.00	.	5445.00
Tripropyleneglycol Methyl Ether	C	3	1	99.00	ug/L	57977.97	37466.95	99000.00	49689.17	37466.95	74133.60
Tripropyleneglycol Methyl Ether	D	4	4	99.00	ug/L	99.00	.	99.00	99.00	.	99.00
Tripropyleneglycol Methyl Ether	E	5	4	99.00	ug/L	9685.20	47535.00	222.75	9685.20	47535.00	222.75
Tripropyleneglycol Methyl Ether	F	5	3	99.00	ug/L	4706.72	4341.80	4950.00	4706.72	4341.80	4950.00
Tripropyleneglycol Methyl Ether	G	4	2	99.00	ug/L	2908.13	3341.26	2475.00	2908.13	3341.26	2475.00
Vanadium	A	20	0	50.00	ug/L	227.69	227.69	.	227.69	227.69	.
Vanadium	B	2	1	50.00	ug/L	1031.00	2000.00	62.00	1031.00	2000.00	62.00
Vanadium	C	3	2	50.00	ug/L	674.00	1062.00	480.00	533.47	1062.00	269.21
Vanadium	D	4	0	50.00	ug/L	27.05	27.05	.	27.05	27.05	.
Vanadium	E	5	5	50.00	ug/L	10.00	.	10.00	10.00	.	10.00
Vanadium	F	5	0	50.00	ug/L	161.11	161.11	.	161.11	161.11	.
Vanadium	G	4	3	50.00	ug/L	50.50	166.00	12.00	50.50	166.00	12.00
Zinc	A	20	0	20.00	ug/L	13468.00	13468.00	.	13468.00	13468.00	.
Zinc	B	2	0	20.00	ug/L	68000.00	68000.00	.	68000.00	68000.00	.
Zinc	C	3	0	20.00	ug/L	72201.33	72201.33	.	72201.33	72201.33	.
Zinc	D	4	0	20.00	ug/L	197.95	197.95	.	197.95	197.95	.
Zinc	E	5	0	20.00	ug/L	936.80	936.80	.	936.80	936.80	.
Zinc	F	5	0	20.00	ug/L	25424.00	25424.00	.	25424.00	25424.00	.
Zinc	G	4	0	20.00	ug/L	13925.00	13925.00	.	13925.00	13925.00	.
1-methylfluorene	A	5	5	10.00	ug/L	1720.00	.	1720.00	787.35	.	787.35
1-methylfluorene	B	2	2	10.00	ug/L	550.00	.	550.00	529.59	.	529.59
1-methylfluorene	C	3	3	10.00	ug/L	3400.00	.	3400.00	386.39	.	386.39
1-methylfluorene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
1-methylfluorene	E	5	1	10.00	ug/L	477.49	586.87	40.00	477.49	586.87	40.00
1-methylfluorene	F	5	4	10.00	ug/L	326.27	111.35	380.00	318.11	111.35	369.80
1-methylfluorene	G	4	1	10.00	ug/L	1733.22	2277.63	100.00	1733.22	2277.63	100.00
1-methylphenanthrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	873.15	.	873.15
1-methylphenanthrene	B	2	2	10.00	ug/L	550.00	.	550.00	550.00	.	550.00
1-methylphenanthrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	577.17	.	577.17
1-methylphenanthrene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
1-methylphenanthrene	E	5	0	10.00	ug/L	2098.00	2098.00	.	2098.00	2098.00	.
1-methylphenanthrene	F	5	4	10.00	ug/L	332.34	91.72	392.50	332.34	91.72	392.50
1-methylphenanthrene	G	4	0	10.00	ug/L	1858.23	1858.23	.	1858.23	1858.23	.
1,1-dichloroethene	A	5	5	10.00	ug/L	820.00	.	820.00	409.46	.	409.46
1,1-dichloroethene	B	2	2	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
1,1-dichloroethene	C	3	2	10.00	ug/L	51.41	134.24	10.00	51.41	134.24	10.00
1,1-dichloroethene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
1,1-dichloroethene	E	5	5	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
1,1-dichloroethene	F	5	2	10.00	ug/L	112.01	180.01	10.00	112.01	180.01	10.00
1,1-dichloroethene	G	4	1	10.00	ug/L	685.73	910.97	10.00	685.73	910.97	10.00

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
1,1,1-trichloroethane	A	5	0	10.00	ug/L	3921.14	3921.14	.	3921.14	3921.14	.
1,1,1-trichloroethane	B	2	0	10.00	ug/L	175.61	175.61	.	175.61	175.61	.
1,1,1-trichloroethane	C	3	0	10.00	ug/L	5482.97	5482.97	.	5482.97	5482.97	.
1,1,1-trichloroethane	D	4	2	10.00	ug/L	16.99	23.98	10.	16.99	23.98	10.00
1,1,1-trichloroethane	E	5	3	10.00	ug/L	10.13	10.32	10.	10.13	10.32	10.00
1,1,1-trichloroethane	F	5	0	10.00	ug/L	330.98	330.98	.	330.98	330.98	.
1,1,1-trichloroethane	G	4	0	10.00	ug/L	367.36	367.36	.	367.36	367.36	.
1,2-dichloroethane	A	5	4	10.00	ug/L	835.00	174.99	1000.	272.10	174.99	296.38
1,2-dichloroethane	B	2	2	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,2-dichloroethane	C	3	1	10.00	ug/L	43.97	15.95	100.	43.97	15.95	100.00
1,2-dichloroethane	D	4	4	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,2-dichloroethane	E	5	5	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,2-dichloroethane	F	5	0	10.00	ug/L	275.31	275.31	.	275.31	275.31	.
1,2-dichloroethane	G	4	0	10.00	ug/L	404.95	404.95	.	404.95	404.95	.
1,2,4-trichlorobenzene	A	5	5	10.00	ug/L	1720.00	.	1720.	1230.10	.	1230.10
1,2,4-trichlorobenzene	B	2	2	10.00	ug/L	550.00	.	550.	550.00	.	550.00
1,2,4-trichlorobenzene	C	3	3	10.00	ug/L	3400.00	.	3400.	1767.01	.	1767.01
1,2,4-trichlorobenzene	D	4	4	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,2,4-trichlorobenzene	E	5	5	10.00	ug/L	26.00	.	26.	26.00	.	26.00
1,2,4-trichlorobenzene	F	5	0	10.00	ug/L	7748.96	7748.96	.	7748.96	7748.96	.
1,2,4-trichlorobenzene	G	4	1	10.00	ug/L	1867.93	2357.24	400.	1867.93	2357.24	400.00
1,4-dichlorobenzene	A	5	5	10.00	ug/L	1720.00	.	1720.	823.18	.	823.18
1,4-dichlorobenzene	B	2	2	10.00	ug/L	550.00	.	550.	550.00	.	550.00
1,4-dichlorobenzene	C	3	3	10.00	ug/L	3400.00	.	3400.	410.59	.	410.59
1,4-dichlorobenzene	D	4	4	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,4-dichlorobenzene	E	5	5	10.00	ug/L	26.00	.	26.	26.00	.	26.00
1,4-dichlorobenzene	F	5	1	10.00	ug/L	1115.80	1344.76	200.	1115.80	1344.76	200.00
1,4-dichlorobenzene	G	4	1	10.00	ug/L	725.68	834.24	400.	725.68	834.24	400.00
1,4-dioxane	A	5	5	10.00	ug/L	820.00	.	820.	661.62	.	661.62
1,4-dioxane	B	2	1	10.00	ug/L	99.73	189.47	10.	99.73	189.47	10.00
1,4-dioxane	C	3	1	10.00	ug/L	772.20	1108.30	100.	772.20	1108.30	100.00
1,4-dioxane	D	4	4	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,4-dioxane	E	5	5	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,4-dioxane	F	5	5	10.00	ug/L	10.00	.	10.	10.00	.	10.00
1,4-dioxane	G	4	4	10.00	ug/L	10.00	.	10.	10.00	.	10.00
2-methylnaphthalene	A	5	3	10.00	ug/L	3521.52	5053.80	2500.	3034.04	5053.80	1687.54
2-methylnaphthalene	B	2	1	10.00	ug/L	4323.95	8547.90	100.	4323.95	8547.90	100.00
2-methylnaphthalene	C	3	2	10.00	ug/L	3415.61	146.83	5050.	1790.68	146.83	2612.61
2-methylnaphthalene	D	4	0	10.00	ug/L	93.59	93.59	.	93.59	93.59	.
2-methylnaphthalene	E	5	0	10.00	ug/L	1570.80	1570.80	.	1570.80	1570.80	.
2-methylnaphthalene	F	5	0	10.00	ug/L	5450.47	5450.47	.	5450.47	5450.47	.
2-methylnaphthalene	G	4	0	10.00	ug/L	17401.62	17401.62	.	17401.62	17401.62	.
2-phenylnaphthalene	A	5	5	10.00	ug/L	1720.00	.	1720.00	206.17	.	206.17
2-phenylnaphthalene	B	2	2	10.00	ug/L	550.00	.	550.00	166.35	.	166.35
2-phenylnaphthalene	C	3	3	10.00	ug/L	3400.00	.	3400.00	144.24	.	144.24
2-phenylnaphthalene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
2-phenylnaphthalene	E	5	1	10.00	ug/L	213.21	256.51	40.00	213.21	256.51	40.00
2-phenylnaphthalene	F	5	5	10.00	ug/L	318.00	.	318.00	151.08	.	151.08
2-phenylnaphthalene	G	4	4	10.00	ug/L	132.50	.	132.50	90.68	.	90.68

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific NDs

Table 12-7. Oils Subcategory Emulsion Breaking/Gravity Separation Data Sets Before and After Sample-Specific Non-Detect Replacement[1]

Analyte	Facility	# Obs	# NDs	Minimum Analytical DL	Units	Original Overall Mean	Original Mean of Detects	Original Mean of NDs	Replaced Overall Mean	Replaced Mean of Detects	Replaced Mean of NDs
2-propanone	A	5	0	50.00	ug/L	434901.13	434901.13	.	434901.13	434901.13	.
2-propanone	B	2	0	50.00	ug/L	3756.99	3756.99	.	3756.99	3756.99	.
2-propanone	C	3	0	50.00	ug/L	9566.12	9566.12	.	9566.12	9566.12	.
2-propanone	D	4	0	50.00	ug/L	3688.19	3688.19	.	3688.19	3688.19	.
2-propanone	E	5	0	50.00	ug/L	15685.72	15685.72	.	15685.72	15685.72	.
2-propanone	F	5	1	50.00	ug/L	76457.88	95559.85	50.00	76457.88	95559.85	50.00
2-propanone	G	4	0	50.00	ug/L	179763.00	179763.00	.	179763.00	179763.00	.
2,3-benzofluorene	A	5	5	10.00	ug/L	1720.00	.	1720.00	578.19	.	578.19
2,3-benzofluorene	B	2	2	10.00	ug/L	550.00	.	550.00	398.87	.	398.87
2,3-benzofluorene	C	3	3	10.00	ug/L	3400.00	.	3400.00	299.25	.	299.25
2,3-benzofluorene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
2,3-benzofluorene	E	5	0	10.00	ug/L	811.19	811.19	.	811.19	811.19	.
2,3-benzofluorene	F	5	5	10.00	ug/L	318.00	.	318.00	257.55	.	257.55
2,3-benzofluorene	G	4	3	10.00	ug/L	245.30	461.22	173.33	245.30	461.22	173.33
2,4-dimethylphenol	A	5	5	10.00	ug/L	1720.00	.	1720.00	693.96	.	693.96
2,4-dimethylphenol	B	2	2	10.00	ug/L	550.00	.	550.00	471.22	.	471.22
2,4-dimethylphenol	C	3	2	10.00	ug/L	3637.61	812.82	5050.00	585.09	812.82	471.22
2,4-dimethylphenol	D	4	1	10.00	ug/L	192.70	253.60	10.00	192.70	253.60	10.00
2,4-dimethylphenol	E	5	1	10.00	ug/L	1148.89	1426.11	40.00	1148.89	1426.11	40.00
2,4-dimethylphenol	F	5	4	10.00	ug/L	319.23	76.15	380.00	287.72	76.15	340.61
2,4-dimethylphenol	G	4	3	10.00	ug/L	271.41	565.63	173.33	271.41	565.63	173.33
3,6-dimethylphenanthrene	A	5	5	10.00	ug/L	1720.00	.	1720.00	628.23	.	628.23
3,6-dimethylphenanthrene	B	2	2	10.00	ug/L	550.00	.	550.00	430.15	.	430.15
3,6-dimethylphenanthrene	C	3	3	10.00	ug/L	3400.00	.	3400.00	320.10	.	320.10
3,6-dimethylphenanthrene	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
3,6-dimethylphenanthrene	E	5	0	10.00	ug/L	837.21	837.21	.	837.21	837.21	.
3,6-dimethylphenanthrene	F	5	5	10.00	ug/L	318.00	.	318.00	270.06	.	270.06
3,6-dimethylphenanthrene	G	4	4	10.00	ug/L	132.50	.	132.50	132.50	.	132.50
4-chloro-3-methylphenol	A	5	0	10.00	ug/L	20756.41	20756.41	.	20756.41	20756.41	.
4-chloro-3-methylphenol	B	2	0	10.00	ug/L	10132.50	10132.50	.	10132.50	10132.50	.
4-chloro-3-methylphenol	C	3	0	10.00	ug/L	32690.67	32690.67	.	32690.67	32690.67	.
4-chloro-3-methylphenol	D	4	4	10.00	ug/L	10.00	.	10.00	10.00	.	10.00
4-chloro-3-methylphenol	E	5	1	10.00	ug/L	903.79	1127.24	10.00	903.79	1127.24	10.00
4-chloro-3-methylphenol	F	5	3	10.00	ug/L	851.79	1079.48	700.00	851.79	1079.48	700.00
4-chloro-3-methylphenol	G	4	4	10.00	ug/L	32.50	.	32.50	32.50	.	32.50
4-methyl-2-pentanone	A	5	4	50.00	ug/L	4162.84	814.20	5000.00	4162.84	814.20	5000.00
4-methyl-2-pentanone	B	2	0	50.00	ug/L	478.91	478.91	.	478.91	478.91	.
4-methyl-2-pentanone	C	3	2	50.00	ug/L	249.65	198.96	275.00	249.65	198.96	275.00
4-methyl-2-pentanone	D	4	0	50.00	ug/L	313.74	313.74	.	313.74	313.74	.
4-methyl-2-pentanone	E	5	0	50.00	ug/L	1037.94	1037.94	.	1037.94	1037.94	.
4-methyl-2-pentanone	F	5	0	50.00	ug/L	15457.91	15457.91	.	15457.91	15457.91	.
4-methyl-2-pentanone	G	4	0	50.00	ug/L	8749.82	8749.82	.	8749.82	8749.82	.

[1] #Obs = Total Number of Samples; #NDs = Number of Samples with Non-Detect Values; Replaced = After Replacement of Sample-Specific Nds

Random Assignment of Seven Emulsion Breaking/Gravity Separation Data Sets *12.3.2.2*

While EPA's assignment of one of the seven emulsion breaking/gravity separation data sets to each oils facility for which EPA needed to estimate current performance was random, the SBREFA Panel raised the concern that this approach may not have resulted in a representative assignment of loadings.

The following explains EPA's procedure. To obtain estimates of current pollutant loadings associated with emulsion breaking/gravity separation, EPA developed estimates of the pollutant loadings at each of the 84 facilities identified as having wastestreams in the oils subcategory. To obtain estimates of pollutant loadings, EPA needed concentration and flow information for each facility. EPA had flow information from all facilities, but had data on pollutant concentrations from only seven facilities where EPA had sampled the emulsion breaking/gravity separation operations. Section 12.3.2.1 describes these seven concentration data sets. To obtain concentration estimates for the remaining facilities in the oils subcategory, EPA assigned one of the seven available concentration data sets to each of those 77 facilities without pollutant concentration data at random. EPA assigned each set to no more than 11 facilities. Then, EPA estimated each facility's pollutant loadings as the product of the total oils wastewater flow at the facility and the pollutant concentrations in its assigned data set. Figure 12-2 shows this procedure.

EPA assigned the seven data sets to each of the 77 oil subcategory facilities for which there was no actual concentration data. EPA assigned the data sets randomly. Thus, EPA did not weight some data sets more heavily than others. After this assignment of the data sets, however, EPA determined that there was one additional facility that would fall within the scope of the proposed oils subcategory, and one facility that was no longer in-scope. EPA removed from the data base the one facility and selected actual concentration data for the newly included facility randomly. The result of this procedure is that each of the seven data sets represented data for 11, 12, or 13 facilities. EPA then calculated pollutant loadings for the total of 84 facilities.

While EPA had randomly assigned the concentration data, EPA reexamined its procedure to assure itself that the results were, in fact, statistically random and concluded they were (see DCNs 23.5, 23.6, and 23.31). Further review of the data established that two of the facilities sampled by EPA had large wastewater flows as compared to all CWT oils subcategory facilities. Of the 84 oils subcategory facilities, flows for these two facilities represented the sixth and second highest wastewater flows. Total flows and total loadings for any groups of facilities that included these facilities would exert influence regardless of the random assignment of the concentration data for facilities for which none was available. In addition, the sampled facility with the highest toxic loadings was assigned to the group with only a total of 11 facilities (the smallest number of facilities in any group).

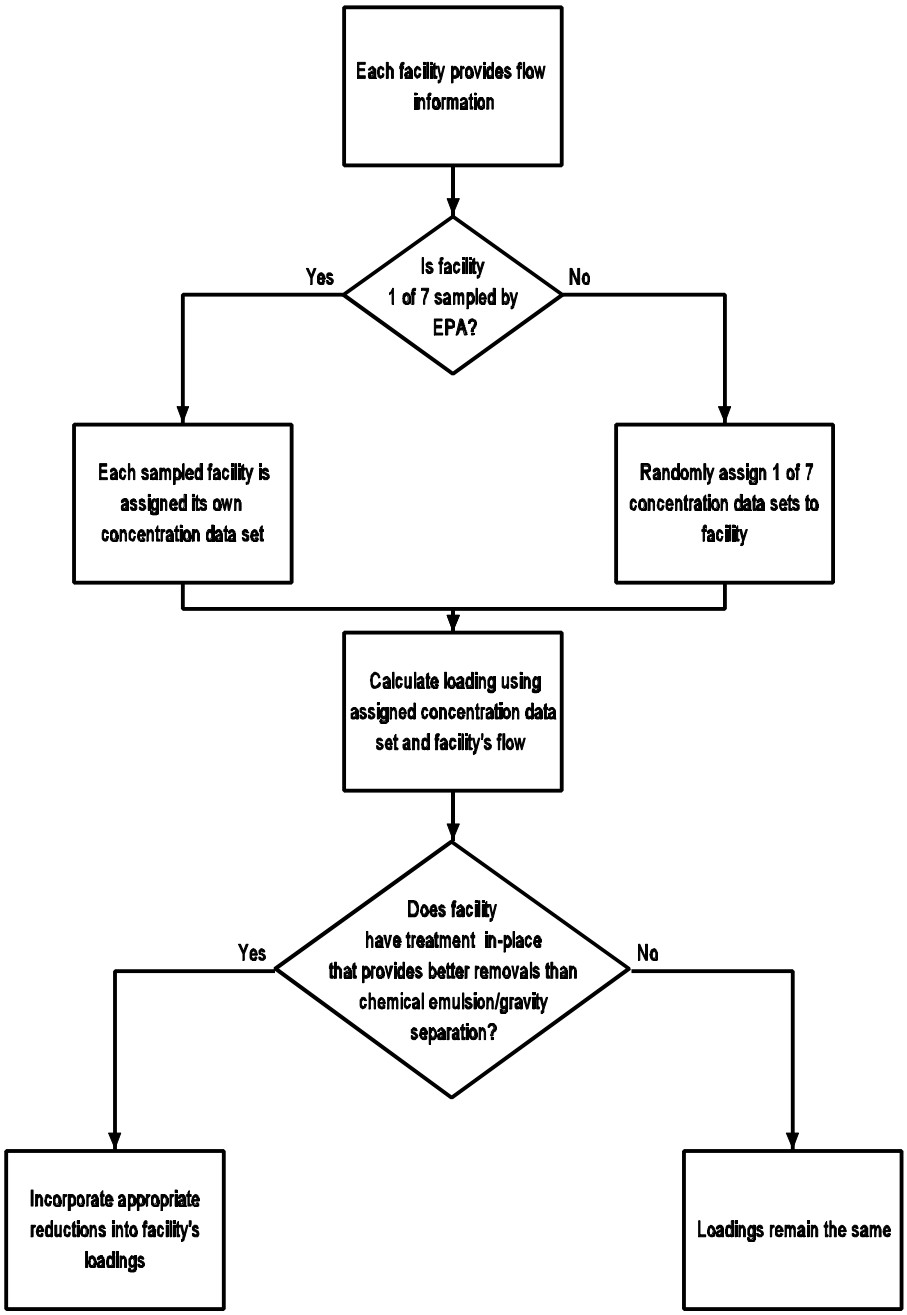

Figure 12-2. Methodology for Current Loadings Estimates in Oils Subcategory

Organics Subcategory Current Loadings *12.3.3*

EPA had limited available data from the organics subcategory and very little data which represent organic subcategory CWT wastewater only. The vast majority of organic facilities commingle large quantities of non-CWT wastewater prior to the point of discharge. Therefore, EPA estimated current loadings based on the treatment technologies in place except for the two facilities for which EPA has analytical data representing organic subcategory wastewater only.

Based on a review of technologies currently used at organic subcategory facilities, EPA placed in-place treatment for this subcategory in one of five classes:

1) raw;
2) filtration only;
3) carbon adsorption;
4) biological treatment; and
5) biological treatment and multimedia filtration.

The discussion below describes the methodology EPA used to estimate current loadings for each classification. Table 12-8 lists the current performance estimates for each classification. This table does not include current loadings estimates for all pollutants of concern in the organics subcategory. EPA excluded the non-conventional bulk parameters, such as chemical oxygen demand, many pollutants which serve as treatment chemicals, and all pollutants not detected at treatable levels in the wastewater influent to the treatment system selected as the basis for effluent limitations.

EPA used the first classification ("raw") for seven organic subcategory facilities with no reported treatment in place for the reduction of organic constituents. EPA based its current loadings estimate for "raw wastewater" on EPA sampling data at two organic facilities. These were Episode 1987, sample points 07A and 07B and Episode 4472[5], sample point 01. For each pollutant of concern and each facility, EPA calculated a long-term average or mean. This mean includes measured (detected) and non-detected values. For non-detected values, EPA used the sample-specific detection limit. Once EPA had calculated the long-term average or mean for each facility and each pollutant of concern, EPA then calculated the mean of the long-term averages from the two facilities for each pollutant of concern to estimate the "raw" current loadings concentrations reported in Table 12-8.

EPA classified in the second category ("filtration only") three organic subcategory facilities which only had multi-media or sand filtration as the on-site treatment technology for the organic waste stream. For these facilities, EPA adjusted the "raw wastewater" concentrations to account for 55 percent removal of TSS, 30 percent removal of metal parameters, 10 percent removal of $BOD_{5,}$ and no removal of other classical or organic pollutants. EPA estimated the percent reductions for facilities in this group using the procedure previously described in Section 12.3.2.

EPA placed in the third category two organic subcategory facilities with carbon adsorption (usually preceded by sand or multi-media filtration). EPA adjusted the "raw wastewater" concentrations to account for 50 percent removal of organic pollutants, 45 percent removal of oil and grease, and no removal of all other pollutants. Again, EPA also estimated the percent removals

[2]After further review, EPA determined that data from one episode (4472) represented a combination of organics and oils subcategory wastewater. EPA will re-visit its current loadings estimates classifications prior to promulgation and incorporate the following changes to the oil and grease loadings concentrations: 29,875 ug/L for raw treatment, 29,875 ug/L for filtration only; 19,419 ug/L for carbon adsorption, 5,440 ug/L for biological treatment, and 5,290 ug/L for biological treatment plus multimedia filtration.

for facilities in this category using the procedure previously described in Section 12.3.2.

EPA based the current loadings concentrations for the fourth and fifth classification on EPA sampling data collected at Episode 1987. EPA calculated the current loadings estimates for each pollutant of concern using a similar procedure to that described above for the "raw" organics subcategory current performance. EPA based the percent removals for five organic subcategory facilities in the fourth classification (biological treatment) on analytical data collected at sample point 12. For the two organic subcategory facilities in the fifth classification (biological treatment and multimedia filtration) EPA based removals on analytical data collected at sample point 14.

Table 12-8. Current Loadings Estimates for the Organics Subcategory (units = ug/L)

Pollutant	Raw[1]	Filtration Only	Carbon Adsorption	Biological Treatment*	Biological Treatment and Multimedia Filtration
CONVENTIONAL POLLUTANTS					
BOD5	22,027,643	19,824,879	22,027,643	2,440,000	1,564,000
Total Cyanide	3,270	3,270	3,270	2,176	2,120
Oil and Grease	176,649	176,649	97,157	176,649	3,900
TSS	1,454,857	654,686	1,454,857	480,000	399,000
METAL POLLUTANTS					
Aluminum	56,363	39,454	56,363	2,474	2,474
Antimony	456	319	456	569	569
Boron	48,098	33,668	48,098	48,098	48,098
Chromium	553	387	553	553	553
Cobalt	277	194	277	437	437
Iron	32,175	22,522	32,175	3,948	3,948
Lithium	11,888	8,321	11,888	11,888	11,888
Manganese	710	497	710	227	227
Molybdenum	1,337	936	1,337	943	943
Nickel	1,426	998	1,426	1,426	1,426
Phosphorus	6,925	4,848	6,925	6,925	6,925
Silicon	2,813	1,969	2,813	2,680	2,680
Strontium	5,088	3,561	5,088	2,060	2,060
Sulfur	1,601,750	1,121,225	1,601,750	1,370,000	1,370,000
Tin	984	689	984	984	984
Zinc	1,402	981	1,402	382	382
ORGANIC POLLUTANTS					
Acetophenone	1,528	1,528	764	36	36
Aniline	1,367	1,367	684	10	10
Benzene	2,776	2,776	1,388	10	10
Benzoic Acid	10,469	10,469	5,234	320	320
Chloroform	4,449	4,449	2,224	73	73
Dimethyl Sulfone	1,449	1,449	724	158	158
Ethylene-thiourea	5,150	5,150	2,575	4,400	4,400
Hexanoic Acid	2,240	2,240	1,120	64	64
M-xylene	1,206	1,206	603	10	10
Methylene Chloride	1,962,725	1,982,725	981,362	204	204
N,N-dimethylformamide	32,846	32,846	16,423	11	11
O-cresol	7,339	7,339	3,699	185	185

Table 12-8. Current Loadings Estimates for the Organics Subcategory (units = ug/L)

Pollutant	Raw[1]	Filtration Only	Carbon Adsorption	Biological Treatment*	Biological Treatment and Multimedia Filtration
P-cresol	3,367	3,367	1,683	66	66
Pentachlorophenol	6,968	6,968	3,484	791	791
Phenol	6,848	6,848	3,424	362	362
Pyridine	3,881	3,881	1,940	116	116
Tetrachloroethene	2,382	2,382	1,191	112	112
Tetrachloromethane	1,706	1,706	853	14	14
Toluene	746,124	746,124	373,062	10	10
Trans-1,2-dichloroethene	1,228	1,228	614	22	22
Trichloroethene	4,645	4,645	2,323	69	69
Vinyl chloride	691	691	345	10	10
1,1-dichloroethane	544	544	272	10	10
1,1-dichloroethene	579	579	290	10	10
1,1,1-trichloroethane	1,444	1,444	722	10	10
1,1,1,2-tetrachloroethane	727	727	364	10	10
1,1,2-trichloroethane	1,191	1,191	595	13	13
1,2-dibromoethane	2,845	2,845	1,422	10	10
1,2-dichloroethane	4,713	4,713	2,357	10	10
1,2,3-trichloropropane	575	575	288	10	10
2-butanone	59,991	59,991	29,996	878	878
2-propanone	6,849,320	6,849,320	3,424,660	2,061	2,061
2,3-dichloroaniline	1,349	1,349	675	23	23
2,3,4,6-tetrachlorophenol	3,340	3,340	1,670	629	629
2,4,5-trichlorophenol	1,365	1,365	683	97	97
2,4,6-trichlorophenol	1369	1369	684	86	86
4-methyl-2-pentanone	3479	3479	1739	146	146

* Current performance estimates for biological treatment and biological treatment with multimedia filtration are equal for metal and organic constituents because EPA only analyzed for conventional parameters at Episode 1987, sample point 14.

[1] EPA used sampling data from Episodes 1987 and 4472 to estimate these "raw" concentrations. After reviewing the data further, EPA determined that data collected at Episode 4472 did not represent "raw" organic subcategory wastewater only and will re-visit between proposal and promulgation.

METHODOLOGY USED TO ESTIMATE POST-COMPLIANCE LOADINGS *12.4*

Post-compliance pollutant loadings for each regulatory option represent the total industry wastewater pollutant loadings after implementation of the proposed rule. For each proposed option, EPA determined an average performance level (the "long-term average") that a facility with well designed and operated model technologies (which reflect the appropriate level of control) is capable of achieving. In most cases, EPA calculated these long-term averages using data from CWT facilities operating model technologies. For a few parameters, EPA determined that CWT performance was uniformly inadequate and transferred effluent long-term averages from other sources.

To estimate post-compliance pollutant loadings for each facility for a particular option, EPA used the long-term average concentrations, the facility's annual wastewater discharge flow, and a conversation factor in the following equation:

$$\text{Postcompliance long-term average concentration (mg/L)} \times \text{Facility annual discharge flow (L/yr)} \times \frac{1\ \text{lb}}{453{,}600\ \text{mg}} = \text{Facility postcompliance annual loading (lbs/yr)}$$

EPA expects that all facilities subject to the effluent limitations and standards will design and operate their treatment systems to achieve the long-term average performance level on a consistent basis because facilities with well-designed and operated model technologies have demonstrated that this can be done. Further, EPA has accounted for potential treatment system variability in pollutant removal through the use of variability factors. The variability factors used to calculate the proposed limitations and standards were determined from data for the same facilities employing the treatment technology forming the basis for the proposal. Consequently, EPA has concluded that the standards and limitations take into account the level of treatment variation well within the capability of an individual CWT to control. If a facility is designed and operated to achieve the long-term average on a consistent basis, and if the facility maintains adequate control of treatment variation, the allowance for variability provided in the limitations is sufficient.

Table 12-9 presents the long-term averages for the selected option for each subcategory. The pollutants for which data is presented in Table 12-9 represent the pollutants of concern at treatable levels at the facilities which form the basis of the options. The pollutants selected for regulation are a much smaller subset.

Table 12-9. Long Term Average Concentrations(ug/L) for All Pollutants of Concern

Pollutant of Concern	Cas Number	Metals Option 3 NSPS/PSNS	Metals Option 4 BPT/BAT/PSES	Oils Option 8 PSES	Oils Option 9 BPT/BAT/NSPS/PSNS	Organics Option 4 ALL
Ammonia-nitrogen	7664417	9,122	15,630	184,375	97,222	1,060,000
Biochemical Oxygen Demand	C-003	28,330	158,000	5,947,500	5,947,500	2,440,000
COD	C-004	108,801	1,333,333	17,745,833	17,745,833	3,560,000
Hexavalent Chromium	18540299	43	800	Failed Test	Failed Test	
Nitrate/nitrite	C-005	12,611	531,666	46,208	20,750	2,280
Oil & Grease	C-007	21,281	21,281	226,829	28,325	Failed Test
SGT-HEM	C-037	Failed Test	Failed Test	142,804	42,528	
Sulfide, Total (Iodometric)	18496258	24,952	Failed Test	Failed Test	Failed Test	2,800
TOC	C-012	19,641	236,333	3,433,750	5,578,875	1,006,000
Total Cyanide	57125	Failed Test	87	96	96	2,176
Total Dissolved Solids	C-010	18,112,500	42,566,666	Failed Test	Failed Test	
Total Phenol	C-020			15,522	17,841	No Data
Total Phosphorus	14265442	29,315	28,051	37,027	31,356	No Data
Total Solids	C-008			No Data	No Data	
TSS	C-009	9,250	16,800	549,375	25,500	480,000
Acenaphthene	83329			137	137	
Acetophenone	98862					35
Alpha-terpineol	98555			48	48	
Aluminum	7429905	72	856	14,072	14,072	2,474
Aniline	62533			Failed Test	Failed Test	10
Anthracene	120127			164	90	
Antimony	7440360	21	170	103	103	569
Arsenic	7440382	11	Failed Test	789	789	Failed Test
Barium	7440393	Failed Test	Failed Test	220	220	Failed Test
Benzene	71432			511	511	10
Benzo(a)anthracene	56553			106	59	
Benzo(a)pyrene	50328			70	70	
Benzo(b)fluoranthene	205992			67	67	
Benzo(k)fluoranthene	207089			67	67	
Benzoic Acid	65850	212	3,521	25,581	37,349	320
Benzyl Alcohol	100516	26	Failed Test	Failed Test	80	
Beryllium	7440417	1	Failed Test	Failed Test	Failed Test	
Biphenyl	92524			76	135	
Bis(2-ethylhexyl) Phthalate	117817	10	Failed Test	115	62	
Boron	7440428	7,290	8,403	22,462	22,462	Failed Test
Bromodichloromethane	75274	10	63			Failed Test
Butanone	78933	50	1,272	11,390	11,390	878
Butyl Benzyl Phthalate	85687			54	54	
Cadmium	7440439	81	44	7	7	Failed Test
Carbazole	86748			151	151	
Carbon Disulfide	75150	10	Failed Test	28	28	Failed Test
Chlorobenzene	108907			87	87	Failed Test
Chloroform	67663	10	167	379	379	72
Chromium	7440473	39	1,177	183	183	Failed Test
Chrysene	218019			79	48	
Cobalt	7440484	57	114	7,417	7,417	437
Copper	7440508	169	581	156	112	703
Di-n-butyl Phthalate	84742			55	55	
Dibenzofuran	132649			135	135	

A blank entry indicates the analyte is not pollutant of concern for subcategory
Zero indicates a value less than 1.0

Table 12-9. Long Term Average Concentrations(ug/L) for All Pollutants of Concern

Pollutant of Concern	Cas Number	Metals Option 3 NSPS/PSNS	Metals Option 4 BPT/BAT/PSES	Oils Option 8 PSES	Oils Option 9 BPT/BAT/NSPS/PSNS	Organics Option 4 ALL
Dibenzothiophene	132650			95	59	
Dibromochloromethane	124481	10	56			
Diethyl Ether	60297					Failed Test
Diethyl Phthalate	84662			759	365	
Dimethyl Sulfone	67710					157
Diphenyl Ether	101848			Failed Test	981	
Endosulfan Sulfate	1031078					0
Ethane, Pentachloro-	76017					Failed Test
Ethylbenzene	100414			273	348	
Ethylenethiourea	96457					4,400
Fluoranthene	206440			253	17	
Fluorene	86737			243	129	
Gallium	7440553	Failed Test	Failed Test			
Germanium	7440564			Failed Test	Failed Test	
Hexachloroethane	67721					Failed Test
Hexanoic Acid	142621	10	Failed Test	9,253	9,253	64
Indium	7440746	Failed Test	Failed Test			
Iodine	7553562	Failed Test	Failed Test			Failed Test
Iridium	7439885	Failed Test	500			No Data
Iron	7439896	387	6,802	53,366	23,283	3,948
Isophorone	78591					Failed Test
Lead	7439921	55	116	98	98	Failed Test
Lithium	7439932	Failed Test	1,926	1,579	1,579	Failed Test
Lutetium	7439943			Failed Test	Failed Test	
M-xylene	108383			1,520	940	10
Magnesium	7439954	752	Failed Test	62,900	62,900	
Manganese	7439965	11	48	5,406	3,811	227
Mercury	7439976	0	1	3	3	
Methylene Chloride	75092	10	Failed Test	4,242	4,242	204
Molybdenum	7439987	555	1,746	1,542	1,542	942
N-decane	124185			2,369	238	
N-docosane	629970			75	20	
N-dodecane	112403			3,834	233	
N-eicosane	112958			615	51	
N-hexacosane	630013			Failed Test	Failed Test	
N-hexadecane	544763			1,386	2,551	
N-nitrosomorpholine	59892	10	45			
N-octadecane	593453			792	202	
N-tetracosane	646311			Failed Test	Failed Test	
N-tetradecane	629594			1,820	3,303	
N,N-dimethylformamide	68122	10	68	Failed Test	Failed Test	10
Naphthalene	91203			1,014	248	
Neodymium	7440008	Failed Test	Failed Test			
Nickel	7440020	270	1,070	1,473	1,473	Failed Test
Niobium	7440031	Failed Test	Failed Test			
o+p Xylene	136777612			1,873	1,218	Failed Test
o-cresol	95487			Failed Test	1,769	184
OCDF	39001020					Failed test

A blank entry indicates the analyte is not pollutant of concern for subcategory
Zero indicates a value less than 1.0

Table 12-9. Long Term Average Concentrations(ug/L) for All Pollutants of Concern

Pollutant of Concern	Cas Number	Metals Option 3 NSPS/PSNS	Metals Option 4 BPT/BAT/PSES	Oils Option 8 PSES	Oils Option 9 BPT/BAT/NSPS/PSNS	Organics Option 4 ALL
Osmium	7440042	Failed Test	Failed Test			
p-cresol	106445			630	956	66
p-cymene	99876			55	55	
Pentachlorophenol	87865					791
Pentamethylbenzene	700129			48	48	
Phenanthrene	85018			649	81	
Phenol	108952			Failed Test	30,681	362
Phosphorus	7723140	544	24,751	44,962	30,657	Failed Test
Pyrene	129000			131	58	
Pyridine	110861	10	86	624	624	116
Selenium	7782492	Failed Test	347	107	107	
Silicon	7440213	355	1,446	19,000	16,850	2,680
Silver	7440224	10	22	Failed Test	Failed Test	
Strontium	7440246	Failed Test	100	774	774	2,060
Styrene	100425			56	56	
Sulfur	7704349	2,820,000	1,214,000	Failed Test	Failed Test	1,370,000
Tantalum	7440257	Failed Test	Failed Test			
Tellurium	13494809	Failed Test	Failed Test			
Tetrachloroethene	127184			475	475	112
Tetrachloromethane	56235					14
Thallium	7440280	20	Failed Test			
Tin	7440315	30	89	106	106	Failed Test
Titanium	7440326	5	56	21	21	Failed Test
Toluene	108883			3,613	3,426	10
Trans-1,2-dichloroethene	156605					21
Tribromomethane	75252	10	32			
Trichloroethene	79016	10	344	669	669	69
Tripropyleneglycol Methyl Ether	20324338	99	917	478	478	
Vanadium	7440622	50	50	Failed Test	Failed Test	
Vinyl Chloride	75014					10
Yttrium	7440655	5	5			
Zinc	7440666	206	421	3,138	2,029	381
Zirconium	7440677	Failed Test	1,286			
1-methylfluorene	1730376			48	33	
1-methylphenanthrene	832699			76	54	
1,1-dichloroethane	75343					10
1,1-dichloroethene	75354			219	219	10
1,1,1-trichloroethane	71556			162	162	10
1,1,1,2-tetrachloroethane	630206					10
1,1,2-trichloroethane	79005					13
1,1,2,2-tetrachloroethane	79345					Failed Test
1,2-dibromoethane	106934					10
1,2-dichlorobenzene	95501					Failed Test
1,2-dichloroethane	107062			272	272	10
1,2,3-trichloropropane	96184					10
1,2,4-trichlorobenzene	120821			117	117	
1,3-dichloropropane	142289					Failed Test

A blank entry indicates the analyte is not pollutant of concern for subcategory
Zero indicates a value less than 1.0

Table 12-9. Long Term Average Concentrations(ug/L) for All Pollutants of Concern

Pollutant of Concern	Cas Number	Metals Option 3 NSPS/PSNS	Metals Option 4 BPT/BAT/PSES	Oils Option 8 PSES	Oils Option 9 BPT/BAT/NSPS/PSNS	Organics Option 4 ALL
1,4-dichlorobenzene	106467			87	87	
1,4-dioxane	123911			Failed Test	Failed Test	
1234678-HPCDF	67562394					Failed Test
2-methylnaphthalene	91576			1,540	160	
2-phenylnaphthalene	612942			Failed Test	15	
2-picoline	109068					Failed Test
2-propanone	67641	140	13,081	Failed Test	Failed Test	2,061
2,3-benzofluorene	243174			Failed Test	54	
2,3-dichloroaniline	608275					23
2,3,4,6-tetrachlorophenol	58902					628
2,4-dimethylphenol	105679			Failed Test	Failed Test	Failed Test
2,4,5-TP	93721					8
2,4,5-trichlorophenol	95954					96
2,4,6-trichlorophenol	88062					85
2378-TCDF	51207319					Failed Test
3,4-dichlorophenol	95772					30
3,4,5-trichlorocatechol	56961207					0
3,4,6-trichloroguaiacol	60712449					Failed Test
3,5-dichlorophenol	591355					0
3,6-dichlorocatechol	3938167					Failed Test
3,6-dimethylphenanthrene	1576676			Failed Test	52	
4-chloro-3-methylphenol	59507			Failed Test	655	
4-chlorophenol	106489					Failed Test
4-methyl-2-pentanone	108101			7,848	6,624	146
4,5-dichloroguaiacol	2460493					Failed Test
4,5,6-trichloroguaiacol	2668248					Failed Test
5-chloroguaiacol	3743235					Failed Test
6-chlorovanillin	18268763					Failed Test

A blank entry indicates the analyte is not pollutant of concern for subcategory
Zero indicates a value less than 1.0

METHODOLOGY USED TO ESTIMATE POLLUTANT REMOVALS 12.5

For each regulatory option, the difference between baseline loadings and post-compliance loadings represent the pollutant removals. For direct discharging CWT facilities, this represents removals of pollutants being discharged to surface waters. For indirect dischargers, this represents removals of pollutants being discharged to POTWs less the removals achieved by POTWs. EPA calculated the pollutant removals for each facility using the following equation:

Baseline Loadings – Postcompliance Loadings = Pollutant Removals

EPA used the following methodology to estimate pollutant removals:

1) If the post-compliance loading of a pollutant was higher than the baseline loading, EPA set the removal to zero;
2) If EPA did not identify a particular pollutant in the wastewater of a facility at baseline and that pollutant was present at baseline in the wastewater of a facility used as the basis for determining limitations and standards associated with one of the regulatory options, EPA set the removal to zero.);
3) If EPA did not calculate a long-term average for a pollutant for a technology option (i.e., the post-compliance loading for the pollutant could not be calculated), EPA set the removal to zero; and
4) For indirect dischargers, EPA additionally reduced the pollutant removal estimate by the POTW removal percentage. Therefore, the pollutant removal estimates for indirect dischargers only account for pollutant removals over and above the POTW removals.

POLLUTANT LOADINGS AND REMOVALS 12.6

EPA estimated annual baseline and post-compliance loadings for each of the subcategories and the respective regulatory options using the methodology described in Sections 12.3 through 12.5 of this document. For the oils subcategory, EPA extrapolated the facility-specific loadings and removals from the 84 in-scope discharging facilities to provide estimates of an estimated total population of 141 discharging oils facilities. Facilities with no wastewater discharge ("zero dischargers") have no pollutant loadings or removals.

Tables 12-10 through 12-13 present the total baseline and post-compliance loadings and the pollutant removals for the facilities in each subcategory.

Table 12-10. Summary of Pollutant Loadings and Removals for the CWT **Metals Subcategory**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
CONVENTIONALS						
Biochemical Oxygen Demand 5-Day (BOD_5)	8,366,557	N/A	570,816	N/A	7,795,741	N/A
Oil and Grease (measured as HEM)	519,480	N/A	74,445	N/A	445,035	N/A
Total Suspended Solids (TSS)	6,109,653	N/A	64,680	N/A	6,044,973	N/A
PRIORITY METALS						
Antimony	34,215	7,504	608	184	33,607	7,320
Arsenic	676	37	301	29	375	8
Cadmium	5,380	16	125	9	5,255	7
Chromium	140,366	289	1,727	147	138,639	142
Copper	205,011	669	1,811	278	203,200	391
Lead	26,012	139	441	36	25,571	103
Mercury	164	16	4	1	160	15
Nickel	52,686	5,024	3,917	1,945	48,769	3,079
Selenium	1,838	1,226	1,346	854	492	372
Silver	421	24	80	6	341	18
Thallium	347	82	347	82	0	0
Zinc	127,400	3,359	1,605	347	125,795	3,012
TOTAL PRIORITYMETALS	**594,516**	**18,385**	**12,312**	**3,918**	**582,204**	**14,467**
NON-CONVENTIONAL METALS						
Aluminum	82,842	3,455	3,042	377	79,800	3,078
Barium	308	64	308	64	0	0
Boron	168,406	92,315	34,766	25,153	133,640	67,162
Cobalt	3,865	885	435	401	3,430	484
Iridium	17,288	3,122	3,499	953	13,789	2,169
Iron	114,752	9,248	24,042	4,329	90,710	4,919
Lithium	146,215	125,992	5,884	5,056	140,331	120,936
Manganese	5,645	1,007	175	107	5,470	900
Molybdenum	16,864	5,863	6,445	3,126	10,419	2,737
Silicon	41,066	6,810	5,100	3,876	35,966	2,934
Strontium	10,831	10,106	350	319	10,481	9,787
Tin	159,531	1,856	330	116	159,201	1,740
Titanium	93,683	586	188	64	93,495	522
Vanadium	4,686	119	150	81	4,536	38
Yttrium	122	43	21	8	101	35
Zirconium	857	223	835	223	22	0
TOTAL NON-CONVENTIONAL METALS	**866,961**	**261,694**	**85,570**	**44,253**	**781,391**	**217,441**
CLASSICAL PARAMETERS						
Chemical Oxygen Demand (COD)	32,170,276	N/A	4,733,770	N/A	27,436,506	N/A
Hexavalent Chromium	235,527	15,106	2,431	2,660	233,096	12,446
Ammonia as N	411,874	N/A	60,506	N/A	351,368	N/A
Cyanide	5,295	1,046	304	96	4,991	950

[1]All loadings and reductions take into account the removals by POTWs for indirect discharges.
HEM - Hexane extractable material

Table 12-11. Summary of Pollutant Loadings and Removals for the CWT **Oils Subcategory**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
CONVENTIONALS						
Biochemical Oxygen Demand 5-Day (BOD_5)	1,099,760	N/A	845,531	N/A	254,229	N/A
Oil and Grease (measured as HEM)	324,206	N/A	4,840	N/A	319,366	N/A
Total Suspended Solids (TSS)	291,300	N/A	4,214	N/A	287,086	N/A
PRIORITY ORGANICS						
1,1,1-Trichloroethane	38	808	13	71	25	737
1,2,4-Trichlorobenzene	12	723	10	56	2	667
1,4-Dichlorobenzene	8	1,012	7	230	1	782
1,1-Dichloroethene	4	185	4	112	0	73
1,2-Dichloroethane	3	66	3	61	0	5
2,4-Dimethylphenol	19	1,088	19	1,088	0	0
Acenapthene	10	80	10	13	0	67
Anthracene	14	242	12	42	2	200
Benzene	166	562	84	117	82	445
Benzo(a)anthracene	11	60	9	15	2	45
Benzo(a)pyrene	9	123	6	19	3	104
Benzo(b)fluoranthene	8	100	6	18	2	82
Benzo(k)fluoranthene	8	122	5	20	3	102
Bis(2-ethylhexyl) Phthalate	24	126,764	7	287	17	126,477
Butyl Benzyl Phthalate	13	576	4	18	9	558
Chlorobenzene	2	14	2	11	0	3
Chloroform	5	396	5	303	0	93
Chrysene	15	102	8	16	7	86
Diethyl Phthalate	13	1,902	13	1,304	0	598
Di-*n*-butyl Phthalate	3	171	3	62	0	109
Ethylbenzene	129	794	36	107	93	687
Fluoranthene	12	4,514	2	812	10	3,702
Fluorene	10	1,459	10	348	0	1,111
Methylene Chloride	26	3,616	26	3,353	0	263
Naphthalene	52	2,319	39	328	13	1,991
Phenanthrene	50	933	13	196	37	737
Phenol	393	2,020	393	1,598	0	422
Pyrene	35	1,309	10	135	25	1,174
Tetrachloroethene	11	823	11	303	0	520
Toluene	677	2,122	314	574	363	1,548
Trichloroethene	7	308	7	179	0	129
TOTAL PRIORITY ORGANICS	**1,787**	**155,313**	**1,091**	**11,796**	**696**	**143,517**
NON-CONVENTIONAL ORGANICS						
1-Methylfluorene	12	384	5	48	7	336
1-Methylphenanthrene	29	592	8	76	21	516
2,3-Benzofluorene	14	236	9	236	5	0
2-Butanone	392	1,508	392	1,144	0	364
2-Methylnaphthalene	45	13,986	26	5,581	19	8,405
2-Phenylnaphthalene	4	90	2	90	2	0
2-Propanone	4,313	62,551	4,313	62,551	0	0
3,6-Dimethylphenanthrene	14	236	8	236	6	0
4-Chloro-3-methylphenol	207	18,504	61	18,504	146	0
4-Methyl-2-pentanone	51	2,158	51	1,894	0	264
∝-Terpineol	8	196	4	17	4	179
Benzoic Acid	875	18,858	875	13,631	0	5,227
Benzyl Alcohol	8	287	8	287	0	0
Biphenyl	37	189	20	19	17	170
Carbazole	5	209	5	109	0	100
Carbon Disulfide	5	141	4	26	1	115
Dibenzofuran	10	101	10	14	0	87
Dibenzothiopene	16	414	10	90	6	324
Diphenyl Ether	105	201	94	201	11	0

Table 12-11. Summary of Pollutant Loadings and Removals for the CWT **Oils Subcategory**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
Hexanoic Acid	488	6,880	488	4,271	0	2,609
m-Xylene	206	332	83	116	123	216
n-Decane	675	283,150	39	11,910	636	271,240
n-Docosane	24	616	3	60	21	556
n-Dodecane	479	12,720	39	1,173	440	11,547
n-Eicosane	207	10,863	8	295	199	10,568
n-Hexadecane	992	178,720	418	2,645	574	176,075
n-Octadecane	143	108,045	33	1,478	110	106,567
n-Tetradecane	1,303	324,806	373	3,374	930	321,432
o-Cresol	32	1,872	32	1,872	0	0
o-&*p*-Xylene	100	649	100	359	0	290
p-Cresol	28	1,301	28	1,046	0	255
p-Cymene	8	5	4	1	4	4
Pentamethylbenzene	29	422	4	24	25	398
Pyridine	4	57	4	57	0	0
Styrene	4	67	4	20	0	47
Tripropyleneglycol Methyl Ether	1,370	62,292	79	1,484	1,291	60,808
TOTAL NON-CONVENTIONAL ORGANICS	**12,242**	**1,113,638**	**7,644**	**134,939**	**4,598**	**978,699**
PRIORITY METALS						
Antimony	13	203	13	128	0	75
Arsenic	15	299	15	155	0	144
Cadmium	16	52	1	4	15	48
Chromium	113	633	18	86	95	547
Copper	1,022	6,240	18	161	1,004	6,079
Lead	684	1,420	16	52	668	1,368
Mercury	0	2	0	1	0	1
Nickel	3,405	15,625	133	2,927	3,272	12,698
Selenium	3	259	3	231	0	28
Zinc	977	24,957	229	3,626	748	21,331
TOTAL PRIORITY METALS	**6,248**	**49,690**	**446**	**7,371**	**5,802**	**42,319**
NON-CONVENTIONAL METALS						
Aluminum	2,071	21,296	2,071	9,185	0	12,111
Barium	198	5,132	26	905	172	4,227
Boron	3,726	258,434	3,074	207,342	652	51,092
Cobalt	45	21,953	45	8,563	0	13,390
Iron	13,460	124,007	2,482	43,448	10,978	80,559
Manganese	427	20,365	406	13,275	21	7,090
Molybdenum	151	3,606	151	2,780	0	826
Silicon	2,811	91,782	2,033	66,395	778	25,387
Strontium	117	4,631	81	3,067	36	1,564
Tin	58	1,661	11	214	47	1,447
Titanium	27	329	3	38	24	291
TOTAL NON-CONVENTIONAL METALS	**23,091**	**553,196**	**10,383**	**355,212**	**12,708**	**197,984**
CLASSICAL PARAMETERS						
Chemical Oxygen Demand (COD)	3,389,871	N/A	2,613,803	N/A	776,068	N/A
Ammonia as N	24,847	N/A	14,843	N/A	10,004	N/A
Total Dissolved Solids	1,046,736	N/A	1,046,736	N/A	0	N/A
Total Organic Carbon (TOC)	1,756,618	N/A	666,656	N/A	1,089,962	N/A
Total Cyanide	7	330	6	181	1	149

[1]All loadings and reductions take into account the removals by POTWs for indirect discharges.
HEM - Hexane extractable material

Table 12-12. Summary of Pollutant Loadings and Removals for the CWT **Organics Subcategory**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
CONVENTIONALS						
Biochemical Oxygen Demand 5-Day (BOD_5)	5,366	N/A	5,366	N/A	0	N/A
Oil and Grease (measured as HEM)	23,062	N/A	23,062	N/A	0	N/A
Total Suspended Solids (TSS)	5,888	N/A	5,888	N/A	0	N/A
PRIORITY ORGANICS						
1,1,1-Trichloroethane	1	154	1	0	0	154
1,1,2-Trichloroethane	2	463	2	1	0	462
1,1-Dichloroehtane	1	48	1	1	0	47
1,1-Dichloroethene	1	183	1	1	0	182
1,2-Dichloroethane	1	314	1	0	0	314
Benzene	1	109	1	1	0	108
Chloroform	9	631	9	6	0	625
Methylene Chloride	27	258,747	27	40	0	258,707
Pentachlorophenol	103	1,779	103	243	0	1,536
Phenol	47	54	47	3	0	51
Tetrachloroethene	15	368	15	7	0	361
Toluene	1	7,722	1	0	0	7,722
Trichloroethene	9	211	9	2	0	209
Vinyl Chloride	1	110	1	0	0	110
TOTAL PRIORITY ORGANICS	**219**	**270,893**	**219**	**305**	**0**	**270,588**
NON-CONVENTIONAL ORGANICS						
1,1,1,2-Tetrachloroethane	1	1,312	1	4	0	1,308
1,2,3-Trichloropropane	1	1,576	1	4	0	1,572
1,2-Dibromoethane	1	1,926	1	5	0	1,921
2,3,4,6-Tetrachlorophenol	82	661	82	140	0	521
2,3-Dichloroaniline	3	243	3	7	0	236
2,4,5-Trichlorophenol	13	292	13	26	0	266
2,4,6-Trichlorophenol	11	140	11	10	0	130
2-Butanone	115	2,432	115	26	0	2,406
2-Propanone	269	361,967	269	146	0	361,821
4-Methyl-2-pentanone	19	1,028	19	8	0	1,020
Acetophenone	5	21	5	1	0	20
Aniline	1	151	1	1	0	150
Benzoic Acid	42	594	42	19	0	575
Diethyl Ether	0	7,640	0	24	0	7,616
Dimethyl Sulfonone	21	22	21	2	0	20
Ethylenethiourea	574	750	574	648	0	102
Hexanoic Acid	8	108	8	5	0	103
m-Xylene	1	638	1	2	0	636
N,N-Dimethylformamide	1	4,957	1	2	0	4,955
o-Cresol	24	1,019	24	31	0	988
Pyridine	15	53	15	2	0	51
p-Cresol	9	280	9	7	0	273
Tetrachloromethane	2	165	2	1	0	164
Trans-1,2-Dichloroehtene	3	400	3	2	0	398
TOTAL NON-CONVENTIONAL ORGANICS	**1,221**	**388,375**	**1,221**	**1,094**	**0**	**387,252**
PRIORITY METALS						
Antimony	74	40	74	40	0	0
Chromium	72	13	72	5	0	8
Copper	92	29	92	29	0	0
Nickel	186	351	186	351	0	0
Zinc	50	96	50	34	0	62

Table 12-12. Summary of Pollutant Loadings and Removals for the CWT **Organics Subcategory**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
TOTAL PRIORITY METALS	**474**	**529**	**474**	**459**	**0**	**70**
NON-CONVENTIONAL METALS						
Aluminum	323	15,395	323	854	0	14,541
Boron	6,279	5,535	6,279	545	0	4,990
Calcium	0	0	0	0	0	0
Iodine	0	1,982	0	0	0	1,982
Iron	515	1,847	515	292	0	1,555
Lithium	1,552	3,911	1,552	3,911	0	0
Magnesium	0	0	0	0	0	0
Manganese	30	219	30	68	0	151
Molybdenum	123	204	123	161	0	43
Phosphorus	904	751	904	0	0	751
Potassium	0	0	0	0	0	0
Silicon	350	893	350	858	0	35
Sodium	0	0	0	0	0	0
Strontium	269	1,723	269	803	0	920
Sulfur	178,861	496,299	178,861	0	0	496,299
Tin	128	147	128	147	0	0
TOTAL NON-CONVENTIONAL METALS	**189,334**	**528,906**	**189,334**	**7,639**	**0**	**521,267**
CLASSICAL PARAMETERS						
Total Cyanide	285	352	285	260	0	92

[1]All loadings and reductions take into account the removals by POTWs for indirect discharges.
HEM - Hexane extractable material

Table 12-13. Summary of Pollutant Loadings and Removals for the **Entire CWT Industry**[1]

Pollutant of Concern	Current Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Wastewater Pollutant Loading (lbs/yr)		Post-Compliance Pollutant Reductions (lbs/yr)	
	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges	Direct Discharges	Indirect Discharges
CONVENTIONALS[2]	16,225,792	N/A	1,524,397	N/A	14,701,395	N/A
TOTAL PRIORITY ORGANICS	2,006	426,206	1,310	12,101	696	414,105
TOTAL NON-CONVENTIONAL ORGANICS	13,463	1,502,013	8,865	136,032	4,598	1,365,951
TOTAL PRIORITY METALS	601,238	68,604	13,232	11,748	588,006	56,856
TOTAL NON-CONVENTIONAL METALS	1,079,386	1,343,796	285,287	407,104	794,099	936,692

[1]All loadings and reductions take into account the removals by POTWs for indirect discharges.
HEM - Hexane extractable material
[2]Oil and grease loadings and removals for the metals subcategory are not included in this table.